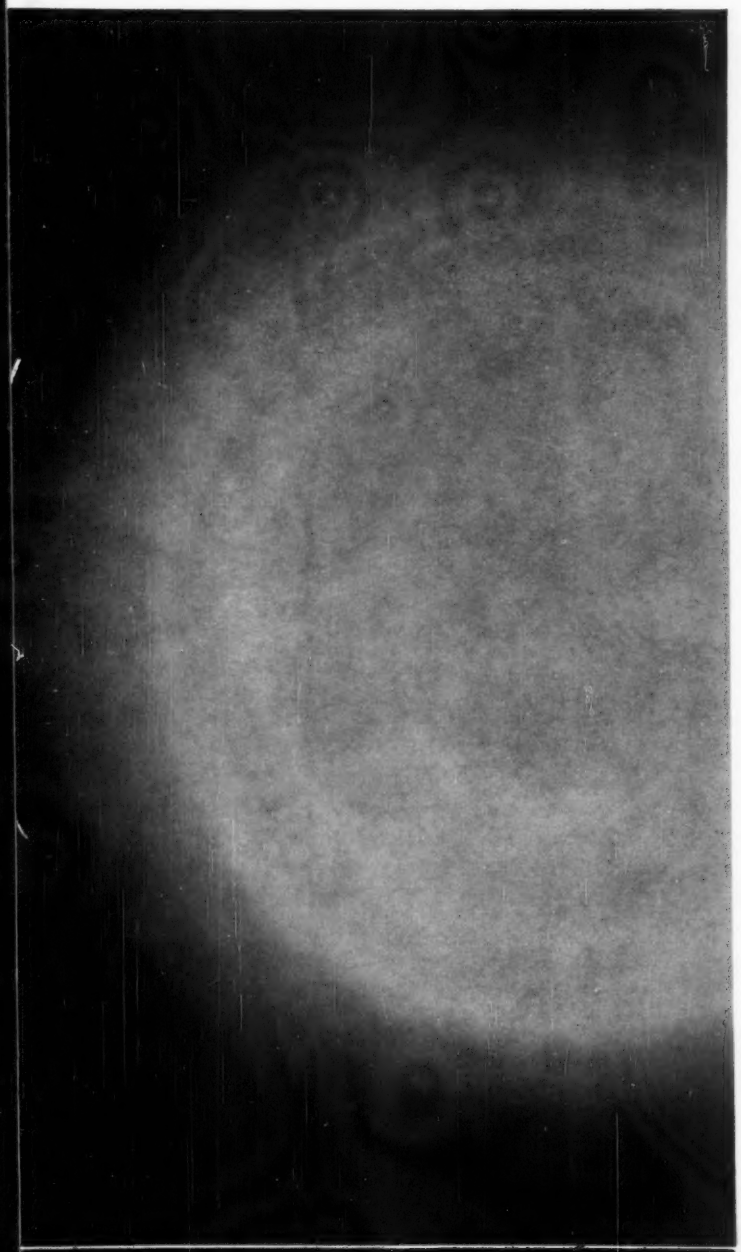
Chemical Week



MAY 14, 1960 Price 50 cents

Egypt warms to foreign investors. Aim: basic chemical buildup p. 39

Plant air conditioning worth the cost? How you can judge . . p. 49

Relocating researchers. Companies find personal touch pays . . p. 103

Green thumbs ring up record spring garden-chemical sales . p. 137

ENERGY ◀CW P

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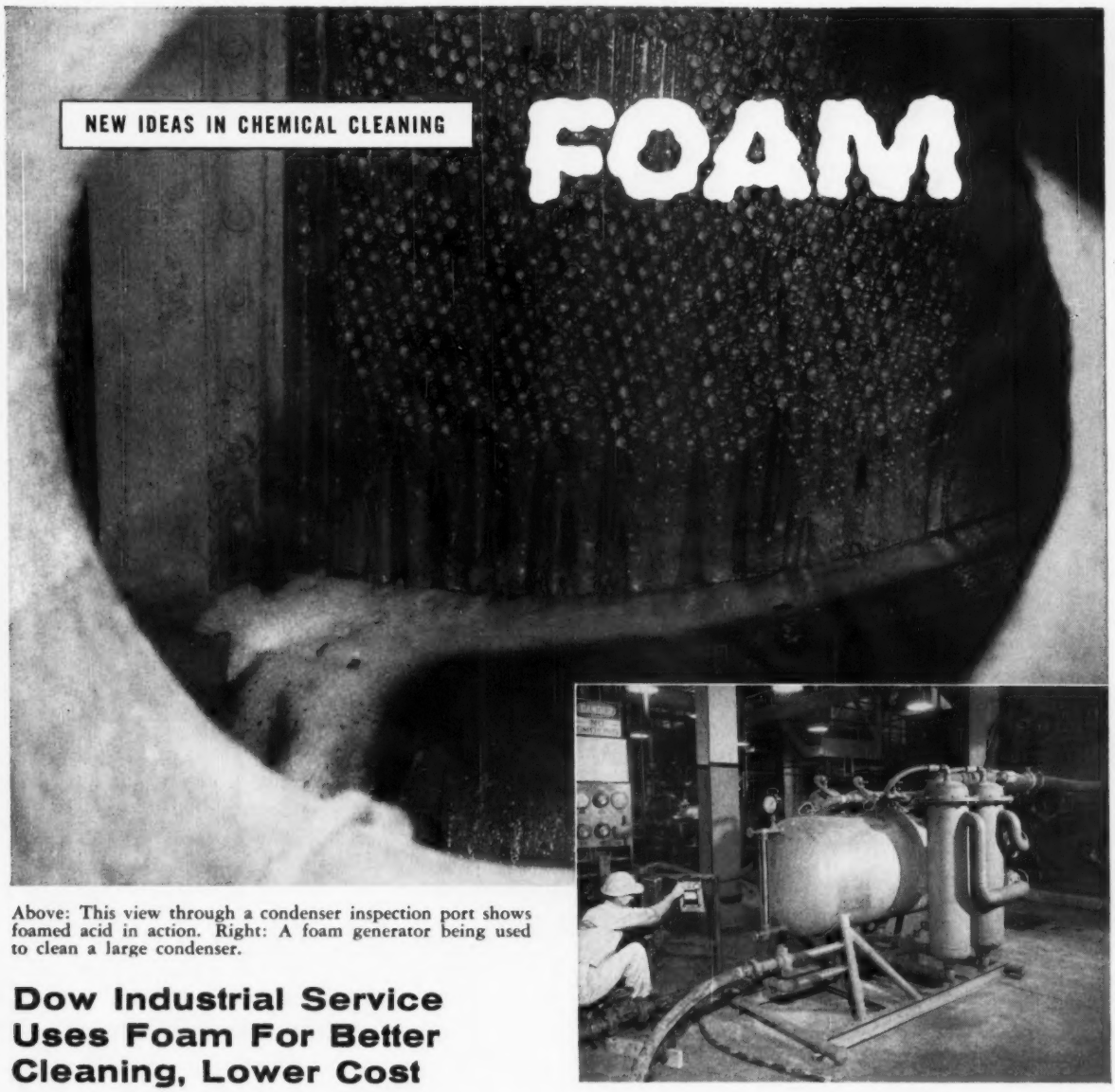
NEW IDEAS IN CHEMICAL CLEANING

FOAM



Above: This view through a condenser inspection port shows foamed acid in action. Right: A foam generator being used to clean a large condenser.

Dow Industrial Service Uses Foam For Better Cleaning, Lower Cost

A newly-developed method of chemical cleaning is helping plant operators reduce the cost of cleaning large-volume vessels.

The new method uses a foaming agent and a special foam generator to expand inhibited acids, water or alkaline solutions to many times their liquid volumes. Foam-to-liquid ratios up to 300-to-one can be attained. For most applications, however, acid is expanded 20 times.

Chemical costs of cleaning large volume vessels with foam instead of liquid are reduced because far less solvent is required.

Reduced solvent requirements mean that disposal or neutralization is simplified.

The light weight of foam makes possible the chemical cleaning of structures where weight is critical.

Foam cleans faster than liquids because solvents can be used at higher concentrations. This helps to reduce both cleaning and outage time.

Certain mechanical benefits result from the use of foamed solvents. The foam provides a scouring action not given by liquids and it carries sloughed materials readily.

Also, foamed solvent fills vessels, pipes and even bent piping as a plug. This eliminates the need for vent connections and reduces the hazard of gases because they are swept out as they are formed.

The foam cleaning technique is just one of many recent developments by Dow Industrial Service to make chemical cleaning faster, safer and less costly.

For engineered recommendations to solve your cleaning problems, contact the field office nearest you, or write Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio.

Chemical Cleaning Services for all industry

DOW INDUSTRIAL SERVICE

DIVISION OF THE DOW CHEMICAL COMPANY

DOW

Chemical Week

TOP OF THE WEEK

May 14, 1960

- **Texas Butadiene, Industrial Rayon look anew for partners,** now that their merger has been cancelled .....p. 41
- **Planning for uranium dearth**—Hanford labs probe plutonium as future reactor fuel .....p. 113
- **New markets are best hope for relieving fats and oils surplus.** Industry, government search for new outlets .....p. 129

Vol. 86, No. 20

PHOTOGRAPH ON COVER AND P. 63 BY BRADLEY SMITH—COURTESY STANDARD OIL CO. OF NEW JERSEY

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There's no question about it's just a matter of how fast

This interim report presents an accurate account of progress at Callery. We really *have* progressed. The hard way, as our many friends already know. But progress we *have*. And progress we *will* with the backlog of exciting new projects we're working on now.

A $9-million Air Force contract for production of pentaborane, for example, was awarded us early this year. We're also working on other new projects in fuels, new propellant compositions, solid and liquid oxidizers, inorganic and organometallic chemistry and thermal energy storage concepts.

Customer orders and field surveys point to a healthy increase in industrial markets for our growing line of boron products, and we've set aside the heaviest expenditures in the history of our company for applications research. One of our projects or one of our boron compounds may have an important bearing on your product planning. We're anxious to discuss their advantages with you.

Now read along with us while our executive staff highlights Callery's recent progress in the field of boron chemistry. Callery Chemical Company, P.O. Box 11145, Pittsburgh 37, Pennsylvania.

CHAIRMAN OF THE BOARD
J. T. Ryan, Jr.

Callery will continue to contribute new ideas in the areas we know best: boron chemistry and fuel and propellant technology. Our continuing developments in both these fields call for new capabilities, new techniques tailored to the needs of our industrial and defense customers. We're adding them now. We are in the industrial chemical business to stay. And our defense business always has fulfilled, most likely always will fulfill, an urgent national need.

PRESIDENT
E. G. Sanner

Our R & D operation at Callery, Pa. employs 122 people. Employment at our Muskogee, Okla. plant, which has been on a "hot standby" since last Fall, will reach approximately 300 when pentaborane production gets under way this summer. Significantly, we are an affiliate of both Mine Safety Appliances Company and Gulf Oil Corporation. We are also the original people in the new boron technology. These factors help guarantee our customers a high degree of stability and dependability—of both products and services.

VICE PRESIDENT,
GULF OIL CORPORATION
DIRECTOR, CALLERY
CHEMICAL COMPANY
Dr. B. B. Wescott

As 50% equal stockholder in Callery, Gulf is genuinely interested in the future of Callery. We believe that boron-based industrial chemicals have a very real future and we are solidly behind this promising effort. It has been most gratifying to us that so many professional analysts have consistently pegged the technical skills of Callery Chemical Company a notch above anyone else in the field.

where Callery's going—

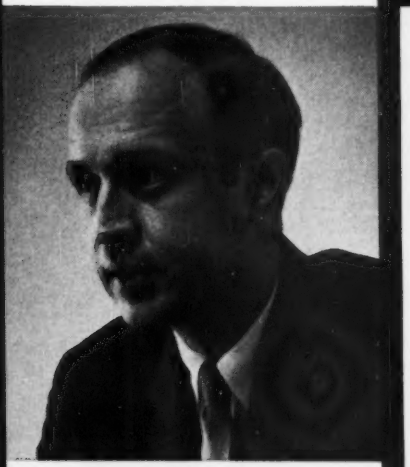
we are going to get there

MANAGER OF MARKETING
R. A. Mulholland

Development of our boron products in the chemical industry has shown a steady, predictable growth. Customer orders for the coming year earmark our chemicals for use as catalysts, additives, stabilizers, reducing agents, and blowing agents. Many more applications are in the development stage. Recent market surveys have more clearly defined our direction toward markets and applications. As a result, we will introduce a number of useful new products for industrial markets in 1960.

MANAGER OF DEFENSE PRODUCT SALES
A. J. Toering

In February, our company was awarded a $9-million contract from the U.S. Air Force. Contract calls for production of pentaborane, a special high energy fuel. The Muskogee, Okla., plant remains as the principal source for any boron-based high-energy compound in production quantities. Callery is working on energy storage concepts, new projects in fuels, new propellant compositions, solid and liquid oxidizers, and inorganic and organometallic chemistry. We are working currently on research contracts with the Air Force, Navy, ARPA, and a number of government prime contractors.



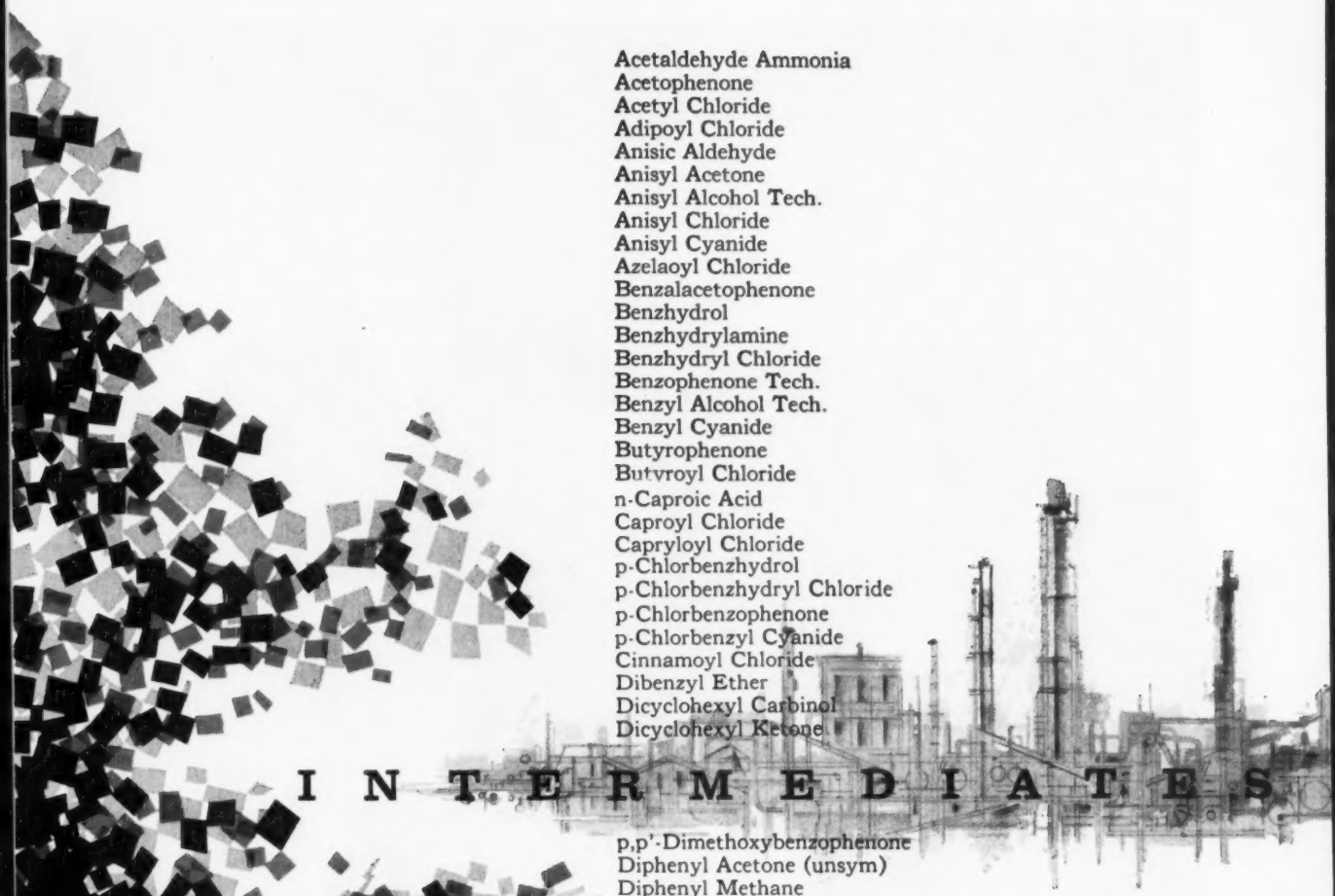
MANAGER OF MANUFACTURING
J. S. Bardin

The flexible nature of our process design at Muskogee, Okla., permits us to make rapid and economical adjustments. We're phasing this plant into pentaborane production for the government instead of the high energy fuel that the operation was originally designed to handle. In addition to these facilities, equipment at the Callery, Pa. plant is set up for production of boron hydrides, borate esters, alkyl boric acids, amine boranes, alkyl boranes, sodium hydride, and nitronium perchlorate.

DIRECTOR OF RESEARCH
G. F. Huff

Applications research now receives the heaviest emphasis in the history of our company. We're working on new uses for upgraded boron hydrides for industry. We are plowing back more money, using more people than ever before to develop the full potential for boron products. To accelerate this activity, we are benefiting from data furnished by outside consultants. This information, as in the past, will be released to industry as fast as we obtain it. An intensive new product development program now under way will offer further insight into how we can best serve our customers. We have a big stake in boron's future.

CALLERY
CALLERY CHEMICAL COMPANY



INTERMEDIATES

Acetaldehyde Ammonia
Acetophenone
Acetyl Chloride
Adipoyl Chloride
Anisic Aldehyde
Anisyl Acetone
Anisyl Alcohol Tech.
Anisyl Chloride
Anisyl Cyanide
Azelaoyl Chloride
Benzalacetophenone
Benzhydrol
Benzhydrylamine
Benzhydryl Chloride
Benzophenone Tech.
Benzyl Alcohol Tech.
Benzyl Cyanide
Butyrophenone
Butyroyl Chloride
n-Caproic Acid
Caproyl Chloride
Capryloyl Chloride
p-Chlorbenzhydrol
p-Chlorbenzhydryl Chloride
p-Chlorbenzophenone
p-Chlorbenzyl Cyanide
Cinnamoyl Chloride
Dibenzyl Ether
Dicyclohexyl Carbinol
Dicyclohexyl Ketone
p,p'-Dimethoxybenzophenone
Diphenyl Acetone (unsym)
Diphenyl Methane
Ethyl Formate Tech.
Ethyl Phenylacetate
beta Ionone
Isobutyrophenone
Isobutyroyl Chloride
Isovaleric Acid
Isovaleroyl Chloride
Lauroyl Chloride
p-Methoxy Phenylacetic Acid
Methyl Heptenone
Methyl Phenylacetate
Myristoyl Chloride
Oleoyl Chloride
Palmitoyl Chloride
Pelargonyl Chloride
Phenylacetic Acid
Phenylacetone
Phenylacetyl Chloride
Phenyl Propyl Alcohol
Phenyl Propyl Chloride
Potassium Phenylacetate
Propionyl Chloride
Propiophenone
Sebacoyl Chloride
Sodium Phenylacetate
Stearoyl Chloride
And
Other Intermediates

Send *for new booklet which describes our operation*

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TITANIUM PIGMENT CORPORATION

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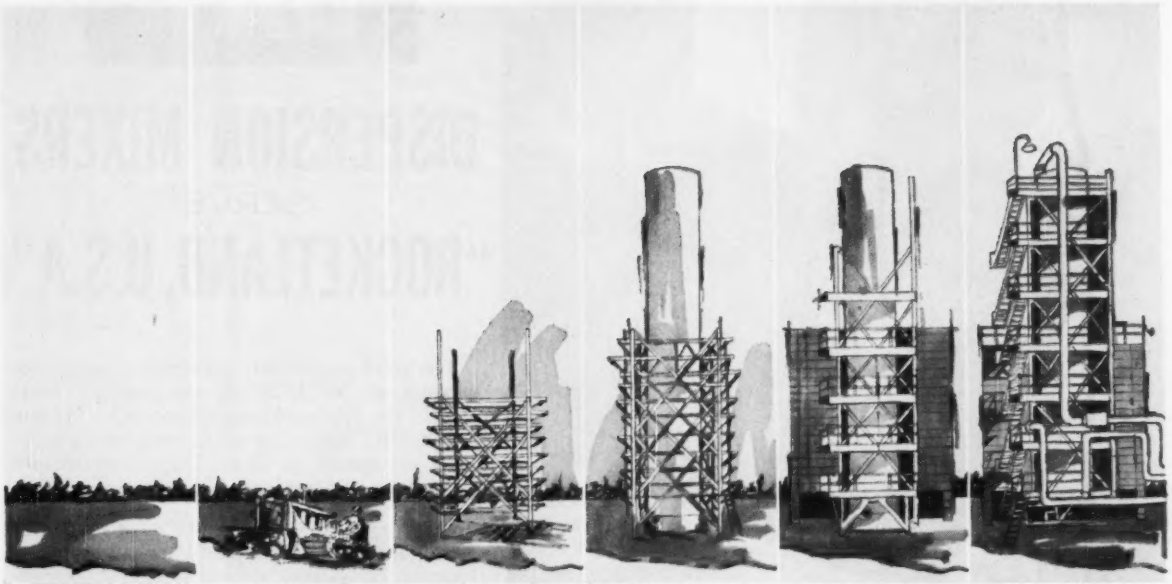
CHEMICO BUILDS NITRIC ACID PLANT IN SIX MONTHS



It took just six months for Chemico to successfully complete a 120 ton per day nitric acid plant in Lawrence, Kansas. Until the client gave his final "go-ahead," not an hour of drafting or engineering had been done on the project—not a single piece of equipment had been placed on order. Yet, six months from that date, the plant finished its acceptance test run, producing at above rated capacity.

With 34 nitric acid plants in operation all over the world, and three more in the design stages at this very time, Chemico maintains its position of leadership in this field. In building plants to produce Ammonia, Urea, Nitric Acid, Acetylene, Methanol, Hydrogen, Sulfuric Acid and other chemical and petrochemical products, Chemico is setting new standards for the entire engineering industry.

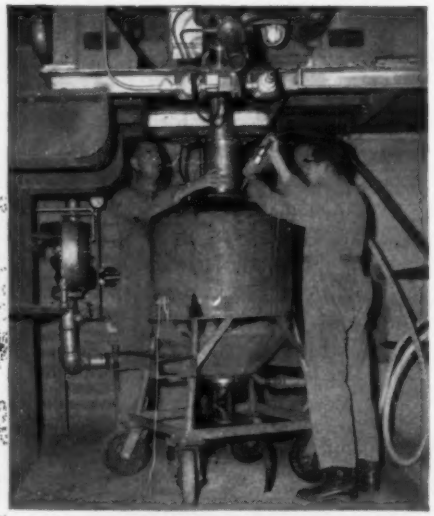
This six month performance for a nitric acid plant follows closely the recent successful completion of an ammonia plant in ten months. It is not just the time factor alone which sets Chemico plants apart, however. Chemico clients know that they are buying efficient, economical, proven processes which assure ease of start-up and simple, safe operation. If you are considering building a new plant or enlarging present process facilities, let Chemico help you get the most for the capital you invest. Write for the General Bulletin which describes the wide range of Chemico's activities.

CHEMICO
CHEMICAL CONSTRUCTION CORPORATION
525 West 43rd Street, New York 36, New York

CHICAGO • DALLAS • HOUSTON • PORTLAND, ORE. • TORONTO • LONDON • PARIS • JOHANNESBURG • TOKYO

New Nobben type blades of DAY Mixer assure thorough mixing

Remote control for DAY Mixer in front building. Mixer building at end of ramp



Underground draw-off section of Mixer Building, from which mixed propellant is transferred to casting site

DAY

DISPERSION MIXERS SERVE "ROCKETLAND, U.S.A."

The solid propellants powering major components of NIKE-ZEUS, the nation's anti-missile, the astronaut's escape rocket on Project MERCURY, and many other vital missile projects, are mixed in DAY Dispersion Mixers throughout "Rocketland, U.S.A."

The Grand Central Rocket Co., of Redlands, formulating the most powerful solid propellants in the country, depends on DAY Dispersion Mixers, ranging from laboratory models to units of 200 gallons capacity, for guaranteed reliability when it comes to processing fuels.

The perfection standards that must prevail in the production of outer space fuels are easily maintained with DAY Dispersion Mixers. Safe, dependable, economical performance is assured by the advanced DAY design and construction features listed below—features which have made DAY Dispersion Mixers so uniformly successful throughout industry.

- Machined Stainless Steel, Jacketed Tank
- "Z" type Cored Blades or the New Overlapping Double Nobben Blades
- Accurate Temperature Control Mechanism
- Many New Safety Devices
- Air-Cylinder Operated Cover, with Over-Pressure Release
- New Safe Divided Style Stuffing Boxes to Protect Bearings and Mixture
- Motorized Dumping Mechanism or Non-Tilt with Special Valves, as preferred
- Designed for Vacuum Operation

For your processing requirements, it will pay you to get all the facts on DAY Mixer advantages. Available in laboratory and production sizes: ¼ to 300 gallon capacities; ¾ to 150 H.P. Write for details, or call in a J. H. Day Company field engineer.

The J. H. DAY Co.

Division of The Cleveland Automatic Machine Co.

QUALITY MIXING, BLENDING, MILLING AND SIFTING EQUIPMENT SINCE 1887

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	Lovibond Color—5¼" Cell-Y/R Max.		
	Original Color Spec.	Color Stability Specification	Typical Color Stability
EMERSOL OLEIC ACIDS			
233 LL (low-linoleic)	3.0/0.5	10.0/3.0	7.0/2.5
221 Low Titer White Elaine	5.0/0.5	20.0/7.0	15.0/5.0
EMERSOL STEARIC ACIDS			
132 Lily (T.P.)	1.0/0.3	4.0/1.8	2.0/1.3
120 (D.P.)	1.5/0.5	7.0/2.0	4.5/1.5
140 Palmitic	1.0/0.3	6.0/2.0	3.0/1.5
150 High Stearic	1.0/0.3	6.0/2.0	3.0/1.5

These new Emery specifications are meaningful because they are based on the new A.O.C.S. standard test method, the first *reproducible* color stability test. Essentially, method L15a-58 subjects samples to 205°C under a blanket of nitrogen . . . stearic acids for 2 hours and oleic acids for 1 hour.

Thanks to this test, you can now compare color stabilities accurately and confirm positively the superior quality of Emersol Stearic and Oleic Acids.

Try them in your product and you will see the difference. For a comparison of these specifications in Lovibond, Photometric Index and Gardner color systems, write Dept. 1-5A for a copy of Technical Bulletin No. 222.

Emersol® Fatty Acids

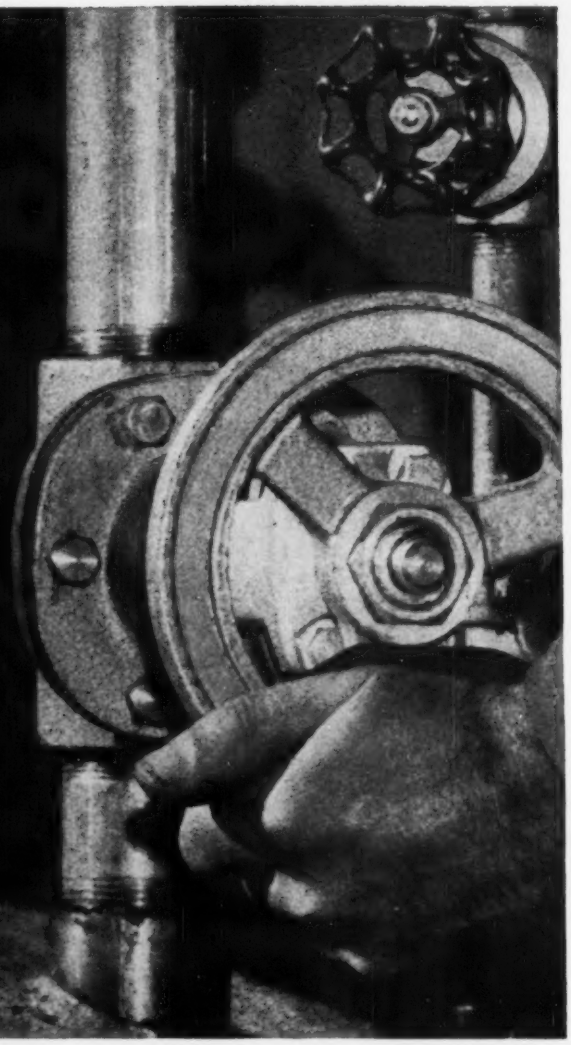
Emery

Fatty Acid Sales Department

Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio—Vopcolene Division, Los Angeles
Emery Industries (Canada) Ltd., London, Ontario—Export Department, Cincinnati

Milestones in Hydride Chemistry

More processors turn to Potassium Borohydride for organic reductions!



And the reasons why are powerful! Price is one. Potassium borohydride is now the lowest priced commercially available borohydride reducing agent, $13.50 per pound*.

Selectivity of reductions is another big reason. Potassium borohydride goes to the heart of a specific reduction without side reactions, without affecting other reducible groups present and without attacking olefinic bonds. This selectivity makes it an ideal reagent for specific reductions of esters,† aldehydes, ketones, and acid chlorides.†

A white crystalline solid with a purity of 98% and density of 1.175 g/cc, potassium borohydride is stable and can be handled and stored safely in air without loss of purity. It can be used in conventional reaction equipment, too, using standard techniques.

As more and more processors have turned to potassium borohydride, a mountain of data concerning its usefulness has been collected. All of this helpful information is contained in the brochure, "$NaBH_4$—KBH_4 Manual of Properties and Reactions." MHI would be pleased to send you a copy without obligation.

*in 10,000 lbs. quantities.

†In a suitable salt-solvent system.

MHI'S TECHNICAL SERVICE TEAM . . . skilled service engineers and custom reaction pilot plant personnel can link any ideas you may have concerning hydrides to process realities for you. Call or write for details!

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514 CONGRESS STREET, BEVERLY, MASSACHUSETTS

these platinum catalysts

simplify product production control

For highest levels of purity . . . definite economy and simplified, accurate production control, the platinum metals catalysts are unique. In the production of high-purity chemicals, pharmaceuticals, vitamins and biotics, their efficiency is unmatched by any other type of catalyst. Here, the world's largest facilities and broadest experience in the development and manufacture of platinum metals catalysts are at your service. A representative will be glad to confer with you, in strictest confidence, of course, or if you prefer, send for brochure "THE ROLE OF THE PLATINUM GROUP METALS AS CATALYSTS."

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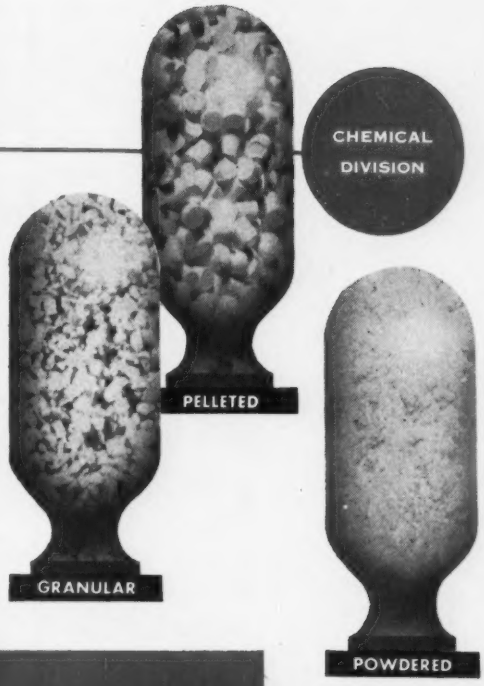

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CHEMICAL DIVISION

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for detection and measurement of oxygen or hydrogen impurities in other gases

MINOXO INDICATOR . . . measures traces of molecular oxygen in other gases—from 1 to 10 parts per million, and from 1 to 100 PPM. High sensitivity and rapid speed of response enable it to be used for laboratory investigation and production quality control.

SUPER-SENSITIVE DEOXO INDICATOR . . . measures oxygen or hydrogen present as impurities in other gases—from 2 to 200 parts per million oxygen and 4 to 400 parts per million hydrogen. Dual range permits measurement up to .25% oxygen or .50% hydrogen. Send for literature.

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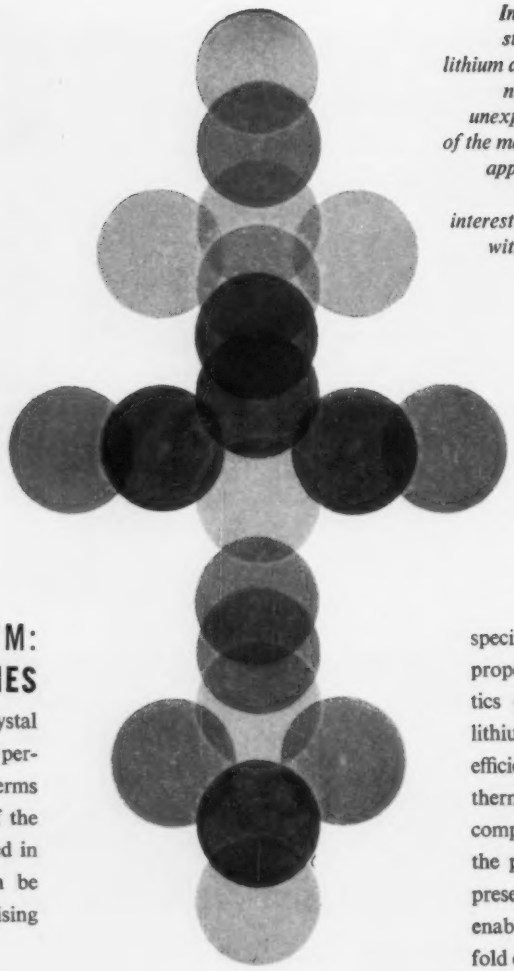

In lithium's differences lie its greatest strengths. Nominally an alkali metal, lithium does not always act like its Group IA neighbors . . . earning it the tag, "the unexpected element." The gratifying fact of the matter is that lithium's most promising applications reflect its most unexpected properties. A number of the more interesting properties, all of them concerned with the solid state, are discussed here.

THE CASE FOR LITHIUM: SOLID STATE PROPERTIES

The wide range of ionic or crystal radii displayed by the alkali metals permits their nominal classification in terms of other cations for which each of the alkali metal ions may be substituted in crystal lattices. Thus, lithium can be associated with 21 elements comprising small crystal ions.

Mg^{2+}, Al^{3+}, Ga^{3+}, Cr^{3+}, V^{3+}, Ti^{4+}, Fe^{3+}, Ge^{4+}, Mo^{6+}, W^{6+}, Ni^{2+}, Co^{2+}, Fe^{2+}, Zn^{2+}, Sc^{3+}, In^{3+}, Zr^{4+}, Hf^{4+}, Sn^{4+}, Nb^{5+}, Ta^{5+}

By comparison, the larger sodium, potassium, rubidium and cesium ions can replace few other cations without materially distorting or disturbing the existing arrangement of lattice units. This size factor . . . plus the ability of lithium ions to aid in stabilizing ions of higher valence state in a host crystal . . . is responsible for the interesting catalytic or semiconductor properties common to mixed lithium oxide—transition metal oxide systems.

Oxides of the type:
$(Li_x M^{2+}_{1-2x} M_x^{3+}) O$ or $Li_x M_{1-x} O$,
where M is Mn, Fe, Co, or Ni, are p-type controlled impurity semiconductors of high electrical conductivity.

METALLURGY A small atom, plus high electronegativity permits lithium alone of all the alkali metals to be incorporated as a beneficial alloying constituent of numerous metals, including Mg, Cd, Al, Be, and Ag. In general, the lithium alloys of these metals exhibit increased strength and better working properties than the base material. One good example is the increased strength at higher operating temperatures of new aluminum-lithium alloy 2020. Lead-lithium alloys also have higher tensile strength than pure lead. By taking advantage of the excellent neutron absorption properties of the lithium-6 isotope, these alloys can be fabricated into excellent shields against thermal neutrons and gamma radiation.

CERAMICS The inclusion of lithium in glasses and glazes yields more condensed and compact structures with decreased thermal expansion and increased stability. It is still difficult to point to the specific atomic, molecular, and ionic properties on which these characteristics depend. But the growing use of lithium in ceramics with a very low coefficient of thermal expansion and high thermal shock resistance is being accompanied by increasing research into the physical chemistry of lithium. The presence of lithium in a glass structure enables the alumina ion to attain fourfold coordination, thus serving as a glass former. And lithium's small ionic radius permits a lithium ion coupled with an aluminum ion to displace two magnesium ions in the spinel structure.

MORE TO COME: The tale of lithium is neither easily nor quickly told. The material presented here constitutes the briefest of introductions. But if it has whet your appetite, we can happily provide you with more of the same—long on facts and ideas, short on flim-flam, and complete with derivations and references. Just write for a copy of "Lithium vs. The Other Alkali Metals". Foote Mineral Company, 420 18 West Chelten Building, Philadelphia 44, Pennsylvania.

FOOTE
MINERAL COMPANY

Proctor solves every drying problem...almost

This one puzzles us for the moment—largely because we're so busy solving individual drying problems in chemical processing. In fact, Proctor has been doing just that for over 75 years.

Because almost every drying problem has its own peculiarities, it's natural to expect drying equipment to vary in design. That's why Proctor engineers go to such great lengths to determine precisely the right equipment design which completely meets your individual needs.

The results of the Proctor custom-engineered approach to continuous, automatic drying are often spectacular. Not only do process performance and product quality increase, but because your equipment is tailor-made to your requirements, costs go down and maintenance is kept at a minimum.

If you have a drying problem, take a minute today to call your nearest Proctor Representative, or write directly to PROCTOR & SCHWARTZ, INC. Remember, when you ask for Proctor, you'll be years ahead for years and years.

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Bagpak Pallet by International Paper

These tough pallets still do their job after long-haul shipment and months of snow and freezing temperatures.

Trial by weather!

International Paper Bagpak® Pallets survive prolonged storage in snow and severe winter weather with no damage to multiwall bags.

WE DON'T recommend storing Bagpak Pallets in the snow. But when one of our up-state New York customers did, he learned the meaning of *real* protection.

The pallets in our photograph, travel-worn and weather-beaten but still completely serviceable, survived the rigors of shipment, *plus* exposure to winter weather for several months! When they were opened, *every* multiwall bag was safe and uniform. And ready to do its job—no matter how tough.

International Paper pioneered this method of shipping and handling multiwalls. Our pallets now have *four* years of on-the-job experience.

And the Bagpak Pallet has a rigid construction that eliminates transit damage due to abrasion. Plus a square design that means a big saving in storage area.

Sixty-two years of papermaking and materials-handling experience are compressed into every Bagpak Pallet. And these rugged pallets are only part of a *complete* multiwall packaging service offered to you by International Paper — world's most experienced papermaker.

Whatever your multiwall packaging needs, you will find it profitable to talk to your Bagpak packaging engineer. He has complete information. It's yours for the asking.

Bagpak Division **INTERNATIONAL PAPER** New York 17, N.Y.

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U.S.I. CHEMICAL NEWS

May 14 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1960

New Electronic Process Is Said to Protect Steel From Many Corrosives

Sulfuric, nitric and phosphoric acids, caustic soda, aluminum sulfate, ammonium nitrate—these are some of the corrosive materials said to lose their sting indefinitely in steel vessels which have been subjected to anodic passivation techniques developed recently.

In the process, an electrode system and a newly developed automatic potential controller are used to form an extremely thin, oxygen-containing film over the steel, and to control this protective film electrically. The process was plant tested for a year, and it is claimed that corrosion in equipment during that period was completely eliminated.

In general, the process is said to be applicable to the oxy acids, bases and salts. The major class of electrolytes excluded are solutions containing halogens. It is reported that control can be established in very complex geometrical vessels, in flow lines, and at temperatures as high as 500° F.—by application of almost negligible currents. The developers of the process say that they can, by laboratory studies, predict the current and voltage requirements for anodically protecting any process or storage vessel.

New Sodium Peroxide Data Sheet Available from U.S.I.

Specifications, typical analysis, properties, shipping data and uses of U.S.I. sodium peroxide are included in a new technical data sheet now available from the company. The compound, which is used widely by the pulp and paper and textile industries for bleaching purposes, also has important applications in making organic and inorganic peroxygen compounds, in bleaching fats and oils, and in processing certain ores.

The new data sheet also offers technical service on sodium peroxide handling and use from U.S.I.'s staff and comprehensive laboratory facilities. For your copy, contact your nearest U.S.I. sales office or address Technical Literature Department, U.S.I. Chemical News, 99 Park Ave., N. Y. 16, N. Y.

New Aerosol Valve Can Operate at Any Angle

A new patented valve arrangement for aerosol containers allows operation at any container position by providing a by-pass to the dip tube which functions when the container is tipped. In an upright position, the by-pass is closed by a slider and the valve operates in the same way as any other—liquid being forced up the dip tube by propellant pressure.

In any inverted position, however, the slider falls away, the by-pass portion of the valve opens and the liquid, instead of going through the dip tube, flows into the by-pass and out through the conventional portion of the valve. The patented valve is essentially an adapter which may be used with some existing aerosol valves. Manufacturing licenses are being offered by the developer to valve producers in this country and abroad.

U.S.I. Introduces "MICROTHENE" Finely Divided Polyethylene

Resin in Powder Form Expected to Expand Use of Polyethylene In Textile, Paper, Metal, Chemical Specialty and Other Fields

Polyethylene in finely divided or powdered form is now being produced by U.S.I. and is available in sample and semi-commercial quantities under the tradename "MICROTHENE". Already in use in Europe, finely divided polyethylene is expected to open many new markets for the resin in this country and to expand a number of existing ones. Some of the applications forseen include its use as an additive in chemical specialties such as waxes and polishes, in the coating of metal, textile, paper, glass and wood products, as a binder for non-woven fabrics, and as molding powder for production of large polyethylene items such as boats, tanks, and shipping drums.

Methods of Application

In coating operations, MICROTHENE polyethylene can be applied to the substrate in its original powder form, as an organic or aqueous dispersion, or as an organic or aqueous paste. The method selected depends largely on the substrate to be coated, the major requirement being that the substrate be able to withstand the heat necessary to fuse the resin into a continuous coating. In the coating of woven and non-woven fabrics, dry polyethylene powder or a paste is generally spread evenly onto a moving web, which then passes through an oven to sinter the plastic into a film coating. Metal parts can be coated by spraying, dipping, or slush coating with either the dry powder or dispersions. Organic dispersions are generally used on metals that would be corroded by water. With modifications of application techniques, strippable polyethylene metal coatings may be possible.

Fluidized Bed Technique

Irregularly shaped objects, wire, and other metal items can also be coated with inex-

MORE

Healing Agent Solubilized By Ethanol in Aerosol Hair Sprays, After-Shaves

It has been suggested that panthenol—the alcohol analog of the B-complex vitamin pantothenic acid—be incorporated more widely into toiletry preparations because of its healing action with wounds, lesions and skin disorders generally. The material is a stable, biologically active form of pantothenic acid—one of the vitamins essential for growth and normal maintenance of skin and hair. It is said to be free of sensitation and irritation problems, and can be adsorbed topically to yield pantothenic acid in the body.

The following are two examples of formulations incorporating the healing agent:

(1) After-Shave Lotion

d-Panthenol	0.500%
Quaternary ammonium salt	0.250%
ALCOHOL (SDA-40)	40.000%
Menthol	0.005%
Ethyl p-aminobenzoate	0.025%
Distilled water	59.220%
Perfume	q.s.
Color	q.s.

(2) Aerosol Hair Spray

d- or dl-Panthenol	1.0%
Water-soluble lanolin	0.5%
Antistatic agent	0.1%
Perfume	q.s.
ALCOHOL (SDA-40)	28.4%
Propellants	70%

Two methods for coating metal with MICROTHENE finely divided polyethylene are shown above. Hot object is dipped in fluidized bed of MICROTHENE, left. Resin dispersed in organic liquid is applied by ordinary spray equipment, right.

May 14 ★ **U.S.I. CHEMICAL NEWS** ★ 1960

CONTINUED

Polyethylene

pensive equipment employing the fluidized bed technique. The item is first preheated, dipped into a container with the fluidized dry powder, and then cooled or post-heated to achieve a smooth, continuous coating.

Plastic Moldings

Another potential market for MICROTHENE finely divided polyethylene is in the field of large plastic moldings. The powder is poured into heated molds which shape the polyethylene as it melts on the surface of the mold. Excess powder is then poured out. The molds required are extremely simple and inexpensive. Large containers, drums, and even small boats have been made successfully by this technique in Europe.

Production Facilities

U.S.I. is now producing MICROTHENE polyethylene at Tuscola, Illinois, site of one of U.S.I.'s two polyethylene plants. The MICROTHENE plant, which went on stream in March, has an initial capacity of 2 million pounds per year and is designed for fairly rapid expansion.

Technical Data Sheet giving detailed application information may be obtained by writing to Technical Literature Department, U.S.I. Chemical News, 99 Park Ave., N. Y. 16, N. Y. Samples are also available.

Sodium Cools Compact Reactor for Satellites

A miniature, sodium-cooled nuclear reactor, easy to scale up from 3 to 30 to 300 kw. with relatively little change in weight or size, has been developed to power communications systems in manned or unmanned satellites.

The 3 kw. version, which can power intermittent broadcasts from an unmanned satellite to the earth for as long as a year, could easily be lifted by present-day rockets. The reactor itself weighs only 220 pounds. Add an auxiliary power unit and the necessary shielding for an unmanned satellite, and the complete package weighs only 900 pounds. Larger rockets, promised for 1964, will be able to lift a *manned* satellite containing the reactor in its 3 or 30 kw. versions.

The reactor is relatively low in cost because it is fueled by uranium blended with zirconium hydride for slower burning. This fuel is contained in fuel elements in the reactor core. Liquid sodium coolant enters the core at 1,000° F., exits at 1,200° F., and transfers heat to a mercury loop. The mercury vaporizes to drive a small mercury vapor turbo-generator.

Although not completely finished yet, with the detailed engineering still to be worked out, this compact, sodium-cooled reactor is thought to be, at the moment, the most likely unit for powering communications in space.

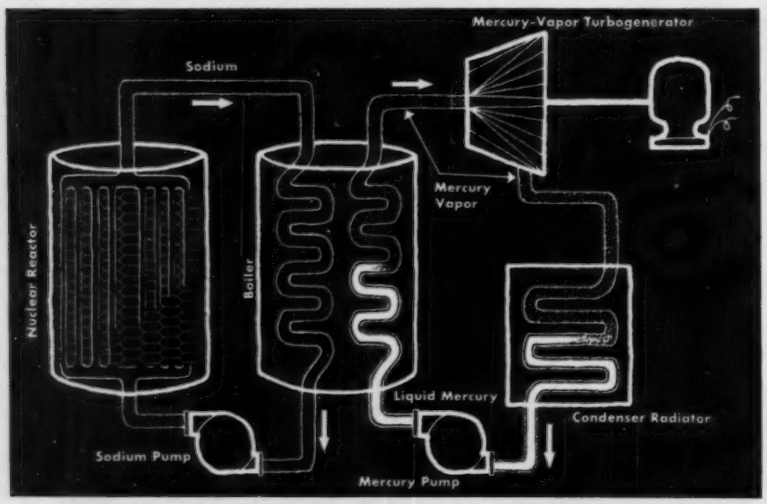


Diagram courtesy of Business Week magazine.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Analytical biochemistry is subject of new international journal now being published to serve biochemistry, biophysics and related areas of experimental biology. Devoted solely to papers describing methods in this area. **No. 1590**

Aerosol chromatography reagents now available from one source include aniline hydrogen phthalate, *p*-anisidine hydrochloride, bromcresol green, ferric chloride, isatin, ninhydrin. **No. 1591**

Protective coating now on market is said to remove rust chemically and to place a protective film over the surface—all in one operation. Can be applied to clean or rusted metal or previously painted surfaces, it is claimed. **No. 1592**

Research quantities of these chemicals are now available: hexanitroethane, trinitromethane, trinitroethanol, tetranitromethane, ammonium nitroform, potassium nitroform, hexanitrodiphenylamine, trinitrophenylmethylnitramine. **No. 1593**

New silicone fluids now available are unusually compatible with diversity of materials. Soluble in many aliphatic hydrocarbons, lower alcohols including ethanol; self-emulsifiable in water. Suggested for paints, cosmetics, other. **No. 1594**

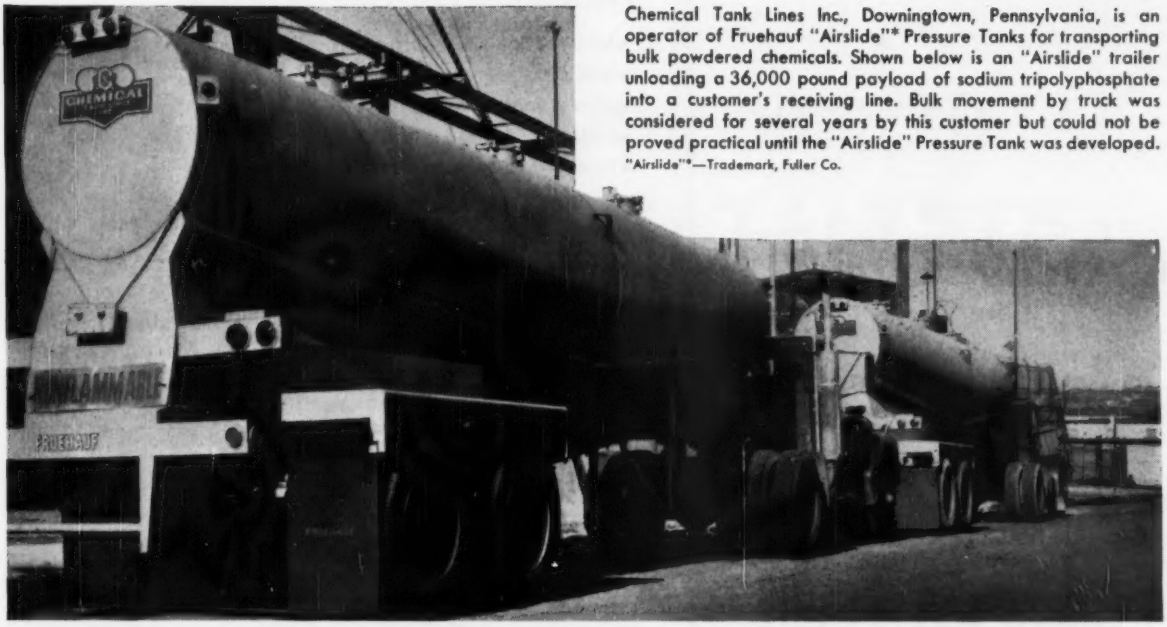
Ammonium sulfate in a specially purified grade, designed for use as a reagent in enzyme research, is now being supplied. Product is said to have extremely low heavy-metal analysis, and to need no recrystallization. **No. 1595**

New magnetic stirrer capable of mixing and stirring solutions in as many as six vessels at one time has been announced. Solves problem of stirring several vessels simultaneously, at the exact same speeds. **No. 1596**

Seventh edition of the Merck Index, standard chemical reference book, can now be purchased. New edition has added tables in appendix, many expanded tables of data, 1600 new monographs on specific chemicals, many other additions. **No. 1597**

Report on sulfathiazole lozenges for preventing colds indicates that in a 6-year controlled study with 3,832 subjects, incidence of respiratory infections was ca. 15% in those using lozenges, ca. 57% in those not using them. **No. 1598**

Complete, low-cost radioisotope laboratory for teaching radioisotope applications in high schools and colleges is described in new bulletin. Lab consists of system of instruments, radiochemicals and lab accessories. **No. 1599**



Chemical Tank Lines Inc., Downingtown, Pennsylvania, is an operator of Fruehauf "Airslide"* Pressure Tanks for transporting bulk powdered chemicals. Shown below is an "Airslide" trailer unloading a 36,000 pound payload of sodium tripolyphosphate into a customer's receiving line. Bulk movement by truck was considered for several years by this customer but could not be proved practical until the "Airslide" Pressure Tank was developed.

"Airslide"*—Trademark, Fuller Co.

Ship Chemicals In Bulk By Fruehauf Tank-Trailer

...To Save Handling, Time and Money!

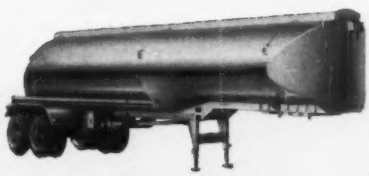
Fruehauf Tank-Trailers provide chemical processor with one all-important service:

They reduce the cost of the job they do.

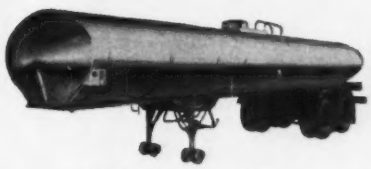
They reduce costs by the swift loading and unloading of commodities that were once painstakingly handled in smaller quantities. A Fruehauf "Airslide"* Pressure Tank, for instance, can pump its full load of aerated, powdered chemicals as high as 80 feet in 30 minutes.

Fruehauf Tank-Trailers deliver incoming materials directly, when they're needed, handle outgoing orders quickly—when they're wanted. They make large, costly inventories unnecessary, are engineered and built for many years of efficient, profitable performance.

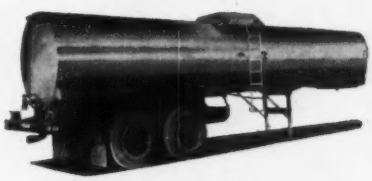
THERE'S A COST-CUTTING FRUEHAUF TANK-TRAILER FOR EVERY LIQUID CARGO



Aluminum Transports
For Water White Chemicals



Sanitary Stainless Units
For Fats and Edibles



Insulated Tanks
For Temperature-Controlled Liquids

FRUEHAUF TRAILERS

For Forty-Six Years—World's Largest Builder of Truck-Trailers!

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Name _____
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Company _____

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clean plants, clear profits

with Dracco Multi-Bag Filters

Freedom from dust in your plant can mean:

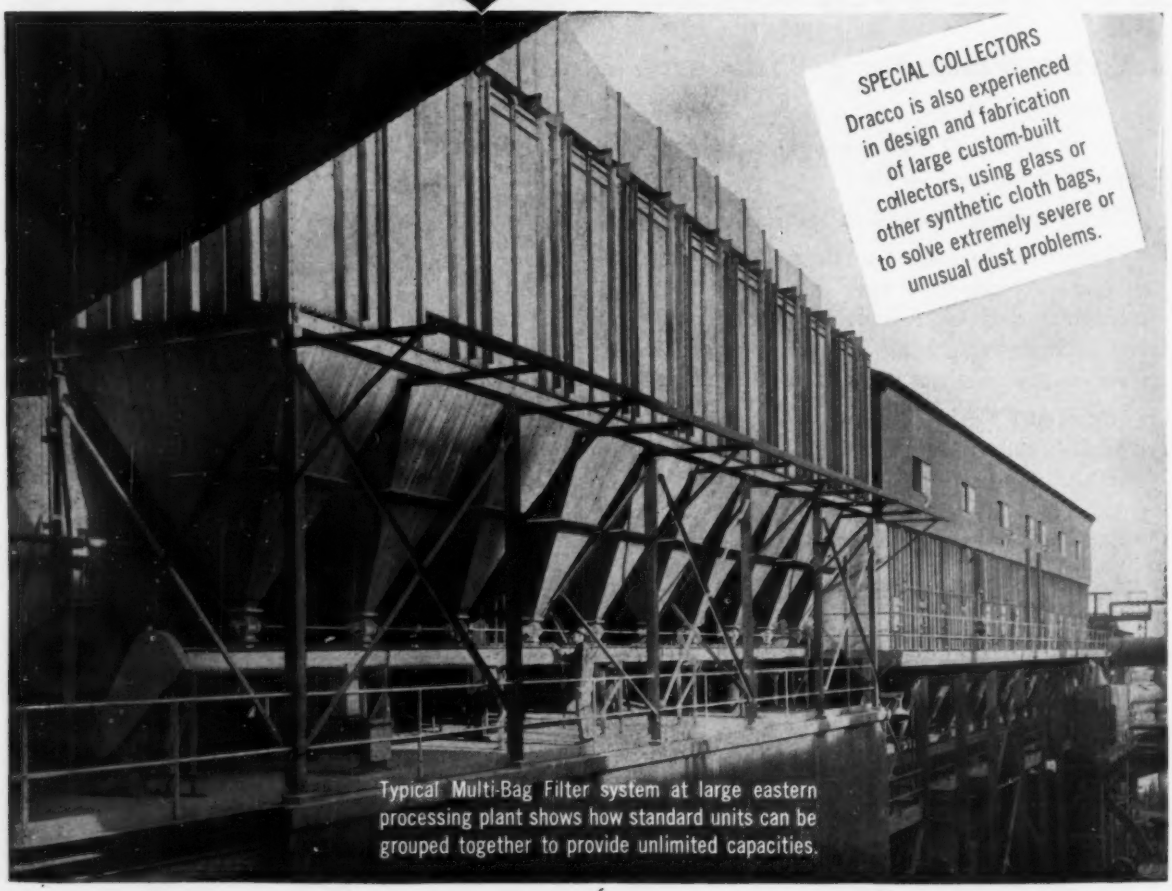
- **lower plant maintenance and cleaning costs**
- **less abrasive wear on machinery**
- **no raw material waste**
- **better working conditions**
- **improved manpower and machine efficiency**
- **no air pollution**
- **guaranteed product purity**

High-efficiency cloth filtration with Multi-Bag Filters can help you clear the way for profits in any or all of these areas. Wide range of standard sizes permits engineering to meet almost any dry collection requirement. Units can be installed in or out of the plant. Operation may be intermittent or continuous, depending on dust loads and degree of automation desired. Long-life filter bags are available in any type cloth, natural or synthetic.

Freedom from maintenance is another benefit that helps you clear extra profits. Simplified, rugged, design with few moving parts keeps Dracco maintenance costs lowest in the industry, year after year.

For full information on Multi-Bag Filters, and other units in Dracco's complete line of dry collection equipment, write: Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors dust control equipment



Typical Multi-Bag Filter system at large eastern processing plant shows how standard units can be grouped together to provide unlimited capacities.

"FUSTEST WITH THE MOSTEST"

IN STEREOSPECIFIC POLYOLEFIN CATALYSTS

FIRST in Service: We believe we have the broadest experience and most complete service available to users or potential users of Stereospecific Catalysts, and invite your inquiries for further information about our services in this area.

MOST in Chlorides:

$TiCl_3$	Commercial production, high-purity anhydrous product in four grades
$TiCl_4$	Commercial production
$VOCl_3$	Commercial production
VCl_3	Developmental quantities
VCl_4	Developmental quantities
TiI_4	Developmental quantities

Other Metal Halides—Developmental quantities

MOST in Metal-Organics:

Aluminum Alkyls: TEAL, TIBAL (triethylaluminum and triisobutylaluminum) and other alkyl aluminum chlorides and hydrides are sold by us exclusively as sales agents for Texas Alkyls, Inc., the country's largest commercial producer by the Ziegler process.

Lithium Alkyls: Now in developmental production of n-butyl lithium and other lithium alkyls.

Boron Alkyls: Now producing developmental quantities of triethyl borane.

Other Metal Alkyls: We have expanded our research program on new metal alkyls and metal-organics.

Inquiry will bring you technical bulletins on the above products and a detailed catalog showing specifications of more than 350 metal-organics and research chemicals available in ampules to tank-car quantities.

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL COMPANY
Anderson Chemical Division, Weston, Mich.
380 Madison Avenue, New York 17, New York
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75 YEARS OF SERVICE TO INDUSTRY AND AGRICULTURE 1885 1960

POWELL
CORROSION-RESISTANT
VALVES

Performance makes the world of difference

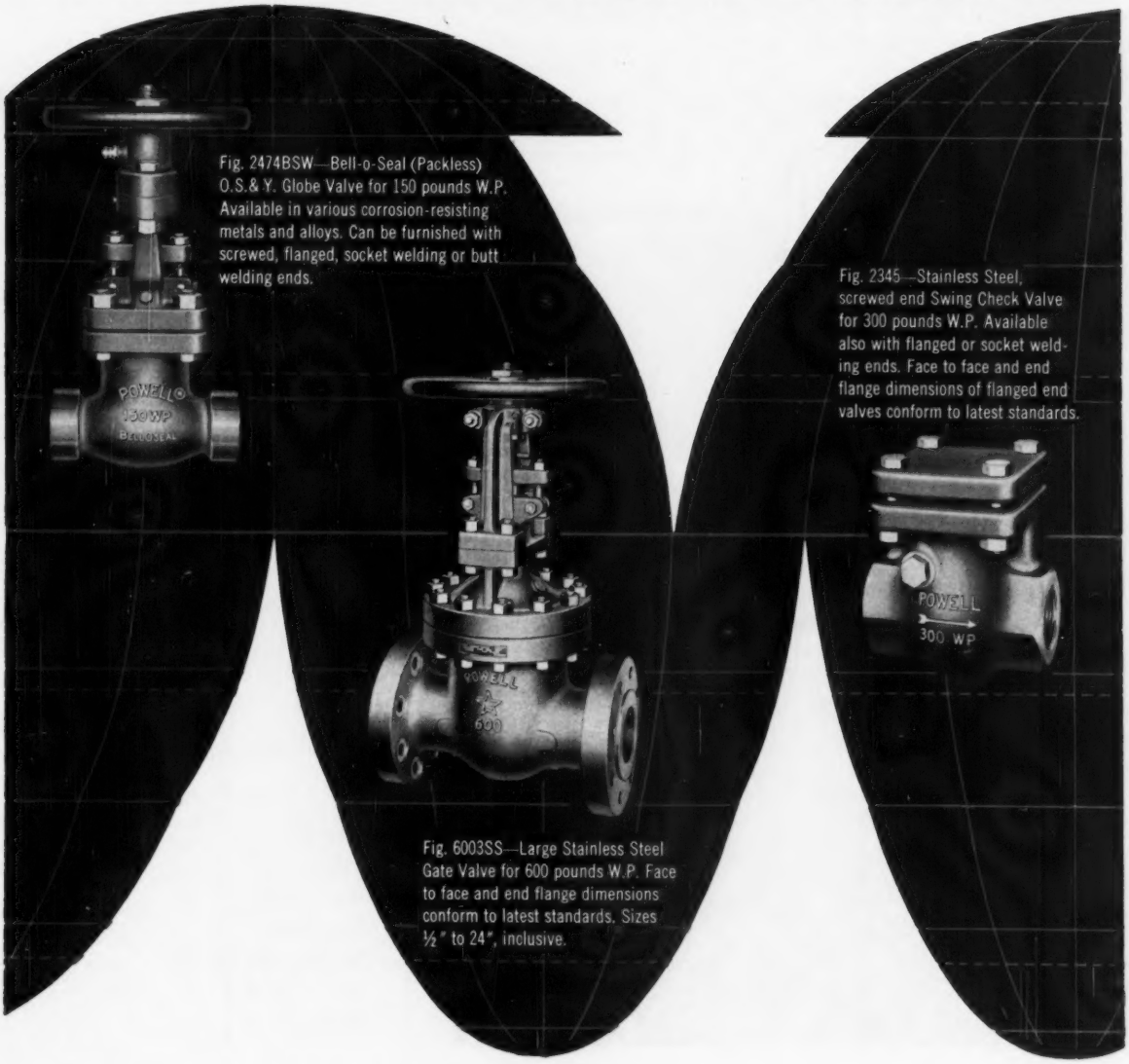


Fig. 2474BSW—Bell-o-Seal (Packless) O.S.& Y. Globe Valve for 150 pounds W.P. Available in various corrosion-resisting metals and alloys. Can be furnished with screwed, flanged, socket welding or butt welding ends.

Fig. 2345—Stainless Steel, screwed end Swing Check Valve for 300 pounds W.P. Available also with flanged or socket welding ends. Face to face and end flange dimensions of flanged end valves conform to latest standards.

Fig. 6003SS—Large Stainless Steel Gate Valve for 600 pounds W.P. Face to face and end flange dimensions conform to latest standards. Sizes ½" to 24", inclusive.

Powell pure metal and special alloy valves have long been recognized by the Chemical and Process Industries as leaders in the field of corrosion-resistant flow control equipment.

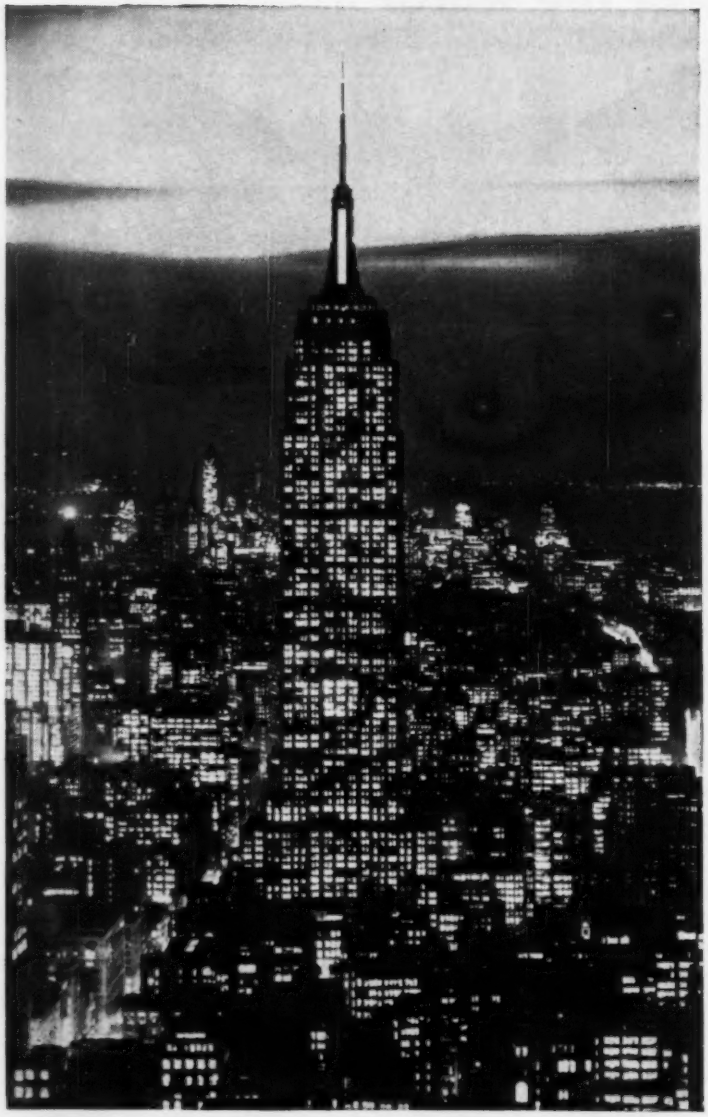
The result of painstaking research; years of experience in modern foundry practice, pattern limitations, and machining possibilities, Powell Corrosion-Resistant valves can be depended upon for long uninterrupted service, with little or no maintenance, and freedom from contamination of end product.

They are available in a wide selection of materials ranging from "A" to "Z" (Aluminum to Zirconium) to handle practically every known corrosive media. For complete details contact your nearby Powell Valve Distributor—or write directly to us.

Powell . . . world's largest family of valves

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

SOME PERFORMANCES HAVE NEVER BEEN EQUALLED—



STANDARD FOR SKYSCRAPERS—Reaching majestically 102 stories and 1,250 feet into the sky, the Empire State Building is the world's tallest. In addition, a 222-foot television antenna towers above the building. Revolving searchlights installed on the 90th floor can be seen 300 miles away. More than 1,000,000 people visit the observation floor annually.

Look at Pine Oil

Someday someone may build a taller building than the Empire State Building —but it hasn't been done yet. And someday someone may invent a better all-round blending ingredient where high solvent performance is required.

Pine oil, of course, adds much more. Its wetting properties, bactericidal properties, and safety are well-known.

Pine oil, which has been in short supply for many years, is now readily available due to increased productive capacity. Look to Hercules for all the pine oil you need.

Just look at Hercules® pine oil's performance as a high-powered solvent:

	Kauri-Butanol Value
Pine Oil	**500+**
Toluol	105
Naphtha, H.A.	95
Turpentine	55
Naphtha, VM&P	34
Mineral Spirits	32
Kerosene	23

When everything is considered, pine oil still remains an outstanding ingredient for many diversified uses.

Pine Chemicals Division, Naval Stores Department

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VIEWPOINT

CPI Unions Need New Goals

News of vitriolic strife between the Oil, Chemical & Atomic Workers at Niagara Falls, N. Y., and the United Mine Workers, District 50 (*CW, May 7, p. 74*) comes as no surprise. It's more evidence that unions in the chemical industry are undergoing fundamental changes.

Most important change affecting unions is the dwindling of their time-honored—perhaps, time-worn—goals. The old crusades over sweatshops and exploiting employers don't carry the force they did when industry safety records were poor, when employees had no feeling of job security, and when the industry was largely a hand and batch operation of long hours and backbreaking work. Today the old union armor is rusty, the battle cries trite.

The noticeable lack of fresh thinking in collective bargaining, the routine pressure for "substantial wage increases," "better working conditions," "more company-paid fringe benefits" show a dull sameness. Indeed, the warfare at Niagara Falls is evidence that maybe there's nothing better to do than pick on sister unions.

Beside changes in goals rides the changing face of public opinion. Employees just aren't buying the old canards. Indeed, the glibbest of the chemical unions today—OCAW—is having the worst time organizing new locals. And the job is getting tougher. At the national level, while the numbers of union members have increased by 24% since '45, their proportion among nonagricultural workers has stayed at 38.5%; unions are winning a smaller and smaller percentage of elections. It can be said, we think, that the Landrum-Griffin bill, the right-to-work movements, and the poor batting average in organizing are symptomatic of dwindling public confidence in unions. Chemical unions have been equally affected.

Furthering the transformation is a new generation of chemical management tutored by, but not dependent upon, their generally antiunion predecessors whose actions sometimes reflected an uneasy feeling that the unions might have something. Today, management's new-found firmness coupled with fairness, its more reasonable argumentation, and its efforts to show employees their relationship to the economy, work in concert. They make such song-and-dance union newspaper headlines as "Victims of a Myth" and "Is Class Struggle Waged from Above?" sound a trifle archaic.

There are more changes ahead. As employees grow older with the aging population, and pension purchasing power takes on meaning for them, as automation keeps shifting work toward the pushbutton away from the wheelbarrow, and as U. S. economic growth takes on stability, industrial relations experts—both in union and management—face a challenge.

The challenge is to reappraise old goals and old methods against the values of today. We submit that chemical unions are more and more becoming guardians of ground gained, less and less frontiersmen. The pioneers had to reach the Pacific sometime.

We think, too, that as advisors and counselors they have a rare opportunity to make new contributions of thought and action to solving the changing social problems of their members.

And we think that as economists and educators they have the opportunity to assist management in shepherding their mutual enterprises to the benefit of all, from owner to operator.

Chemical unionists should stop unproductive bickering with their colleagues, and start building for their members.

LETTERS

New Neoprene Process

TO THE EDITOR: Your March 26 issue was airmailed to me at our Geneva office as is customary when I am abroad. In addition to the many interesting writeups, the "CW Report" on acetylene was well worth the postage. You have given a thorough analysis in depth, with conclusions that parallel those of a recent study by Aries Associates. This kind of detailed technico-economic treatment is rarely available for a mere magazine subscription.

To stress further the relatively slow future growth for acetylene, even neoprene — which you say "has the distinction of being the only major product based entirely on acetylene" — will be seriously challenged by petroleum-derived C_4 fractions such as butene or even butadiene. As indicated in the spring 1960 issue of our house organ "Chemonomics," the C_4-based process, which has been thoroughly pilot-planted in western Europe, augurs to be lower in manufacturing costs and plant investment. Very importantly, it can be adapted to smaller units than those from acetylene, thus can be installed even in countries with smaller markets. It may well be that Du Pont and its licensees may not be the sole producers in the near future.

ROBERT S. ARIES
Aries Associates, Inc.
Stamford, Conn.

Dishwashing Rinse Aids

TO THE EDITOR: Congratulations on a fine publication. . . .

One comment within the article "Rinse Aids: Million-Dollar Sales Sparkle" *(Feb. 20)* caused considerable interest here: "Currently hampering the additives' sales is reluctance of some manufacturers of commercial dishwashers—e.g., Hobart Mfg. Co. (Troy, O.) and G. S. Blakeslee & Co. (Chicago)—to install injectors on such equipment. Restaurants must buy the injectors separately.". . .

Rather than "hamper" sales of rinse additives and/or washing compounds, we try to do everything within our power to encourage the use of modern and efficient additives. It is our understanding that the leading detergent companies prefer to have their specially trained representatives install dispensers and/or injectors on our machines in the field. In this way the equipment can be set up correctly to allow for varying factors such as line water pressure and water hardness. We have always tried to cooperate with the detergent people, but we believe, as they seem to, that the ultimate user is best served by the installation of rinse additive or detergent control equipment at the job site.

It should be borne in mind that there is nothing at all standardized about a dishroom layout. In fact, layouts vary considerably, and what would be a convenient location for a rinse injector (on our machine) in one installation may be quite impossible to reach in another. . . .

A further point is, of course, that any special equipment placed on our machine prior to shipment carries our full warranty, and we are certain that the leading detergent companies would not expect us to guarantee the continued performance of their dispensers and injectors. These items require periodic attention in the field and this is normally rendered by the detergent company salesman on his follow-up call with his and our customer.

JACK CUMMING
Director of Sales
G. S. Blakeslee & Co.
Chicago

MEETINGS

Chemical Market Research Assn., meeting; theme: construction needs plastics may fill; Biltmore Hotel, New York, May 18.

Operations Research Society of America, annual meeting, Statler Hotel, New York, May 19-21.

Technical Assn. of the Pulp & Paper Industry, coating conference, Edgewater Beach Hotel, Chicago, May 23-25.

The Materials Handling Institute, New England show, Commonwealth Armory, Boston, June 6-8.

1960 International Powder Metallurgy Conference, Biltmore Hotel, New York, June 13-15.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, June 14.

Technical Assn. of the Pulp & Paper Industry, pulp bleaching conference, Edgewater Beach Hotel, Chicago, June 14-16.

Parenteral Drug Assn., Edgewater Beach Hotel, Chicago, June 24.

ELEMENTARY...

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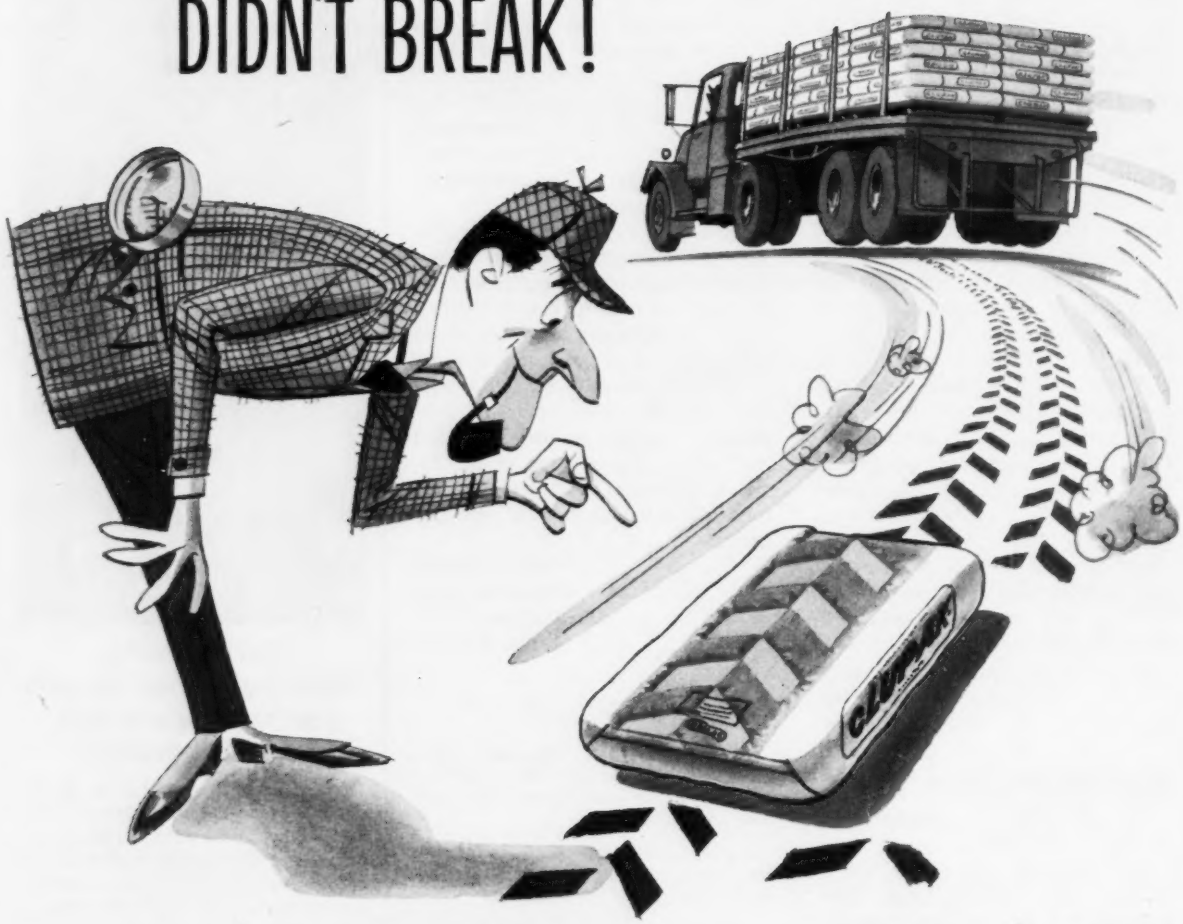

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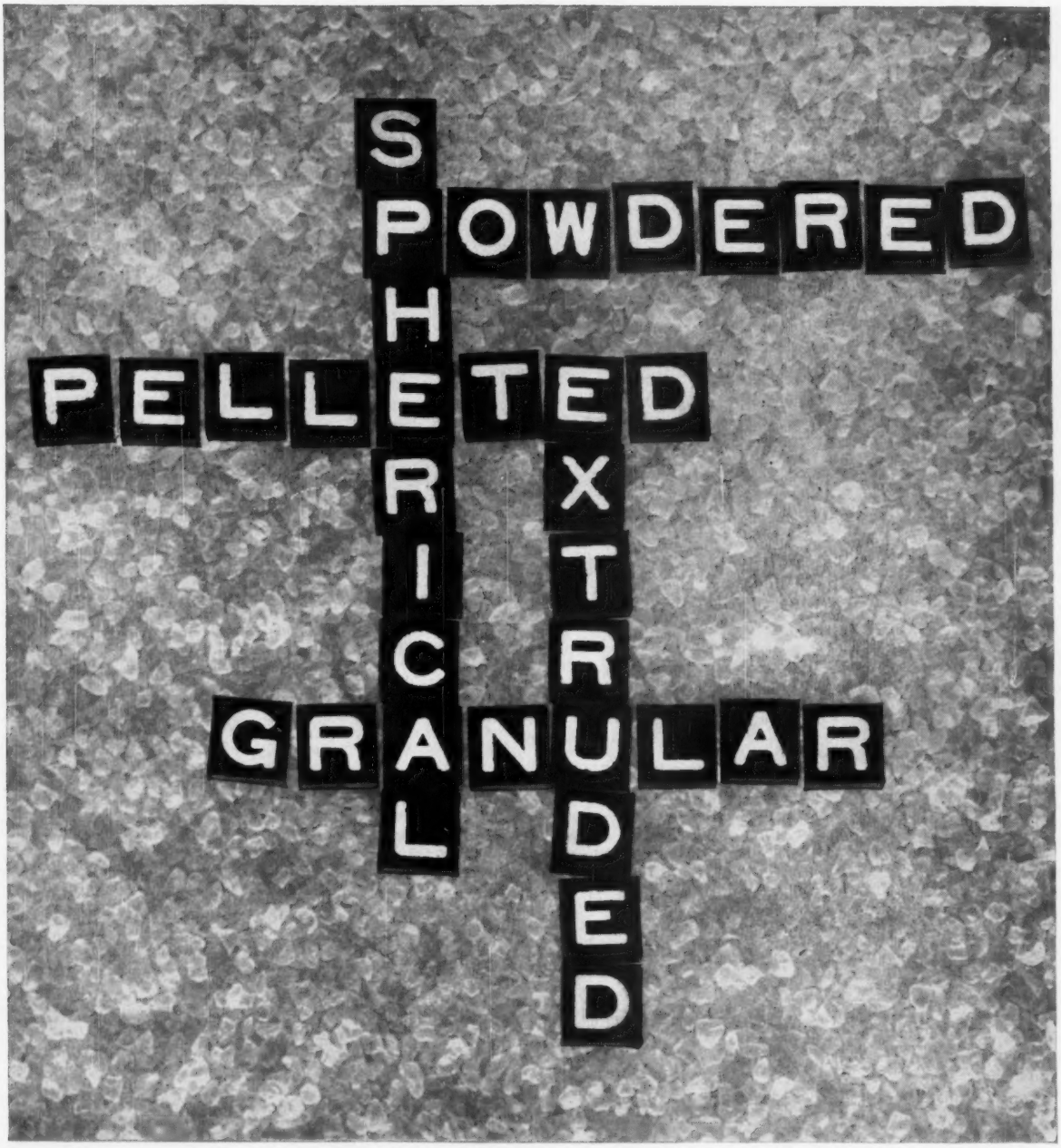

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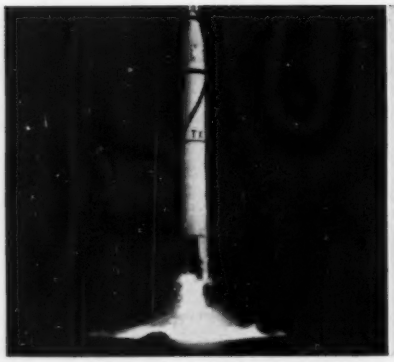
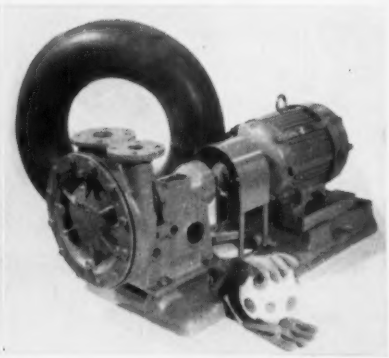
PUMPAGE

Goulds news about pumps for process industries





Rocket's red roar

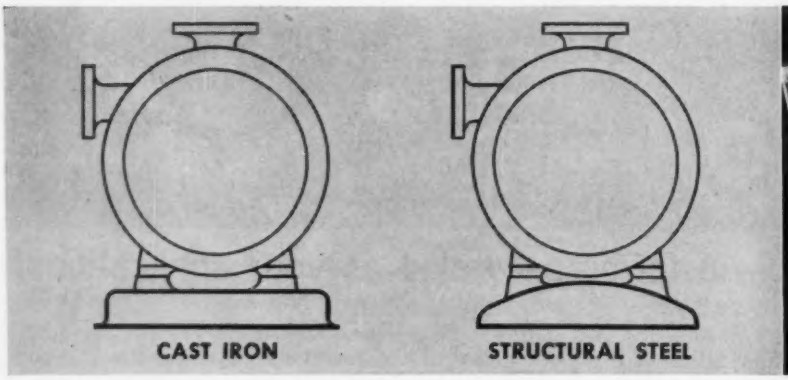
After the countdown—a roaring and soaring! The fuels that make rockets roar contain highly abrasive solids, ignite and burn rapidly with the slightest contact with air or oxygen. Handling them is a problem—pumping temperatures run as high as 550° F. For one government installation, Goulds developed a vertical process pump with an inert gas chamber that is used as a barrier between pumpage and rotating shaft seal. Gas pressure is maintained by an automatic purgerator slightly above suction inlet pressure to insure no contact between the mechanical seal and the abrasive solids. This pump has been found so broadly applicable that it is now a standard model in our line.

Now . . . a centripetal pump!

A unique use of centripetal action lets Goulds Fig. 2520 handle liquid, air, or liquid *and* air! The centrifugal force of the impeller separates the liquid from the lighter air, which accumulates at the center of the impeller and casing. The liquid, circulating at the casing periphery, is directed (by centripetal action) toward the center, pushing the air ahead of it and through the discharge. Once primed, this pump *stays* primed! It can't air bind—even with loops or leaks in your suction line. Handles foaming solutions and emulsions easily. You can use it for almost anything: as a scavenger, for transfer work, for cleaning up, for pilot plant work. Ask for Bulletin 725.6 for all the details!

Latex: Handle with Care

Before synthetic latex can become the bouncy consumer products you see here, it must be a fairly instable liquid, able to gel or coagulate easily. For that reason, a pump must handle latex gently or the impeller will clog and have to be cleaned frequently. Such a pump is the Goulds Fig. 3715—six of which are presently being used by a rubber manufacturer to transfer latex from storage tanks to tank cars and in the latex concentrator line. A semi-open impeller allows a minimum of mechanical shock or friction at optimum efficiency. Normal cleaning operations are performed easily, because the casing cover and impeller can be easily removed without disturbing pipe connections. Bulletin 725.4.



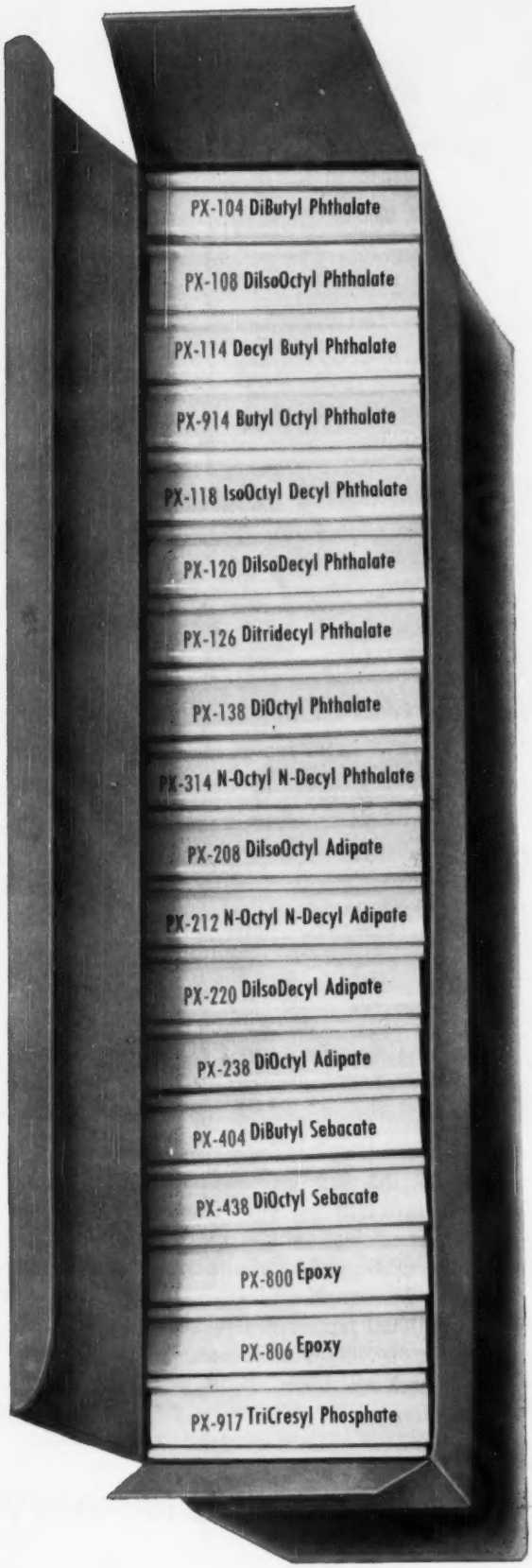
Cast-iron bedplates

A rigid well-grouted bedplate under your pump and driver is the first requirement for trouble-free operation. Accordingly, Goulds furnishes rigid corrosion-resistant cast-iron bedplates as standard at no extra cost. The Goulds special camber top prevents accumulation of corrosive liquids. The camber design with its large accessible grout hole at the high point insures complete fill-up of bedplate cavity with grout. This economical design, jig-drilled for pump and motors, provides integral motor pad, eliminating costly separate motor base.

Get all the news monthly—FREE!

If you've liked reading about the new designs and applications of pumps as presented on PUMPAGE, then you'll appreciate getting a sister publication, GOULDS NEWS, mailed to you free every other month. GOULDS NEWS is a 4-page newsletter that highlights new developments in pumps and profitable ways that they are used. You can add your name to our mailing list by merely writing, on your letterhead, to Goulds Pumps, Inc., Dept. CW-50, Seneca Falls, N. Y.

GOULDS GP PUMPS



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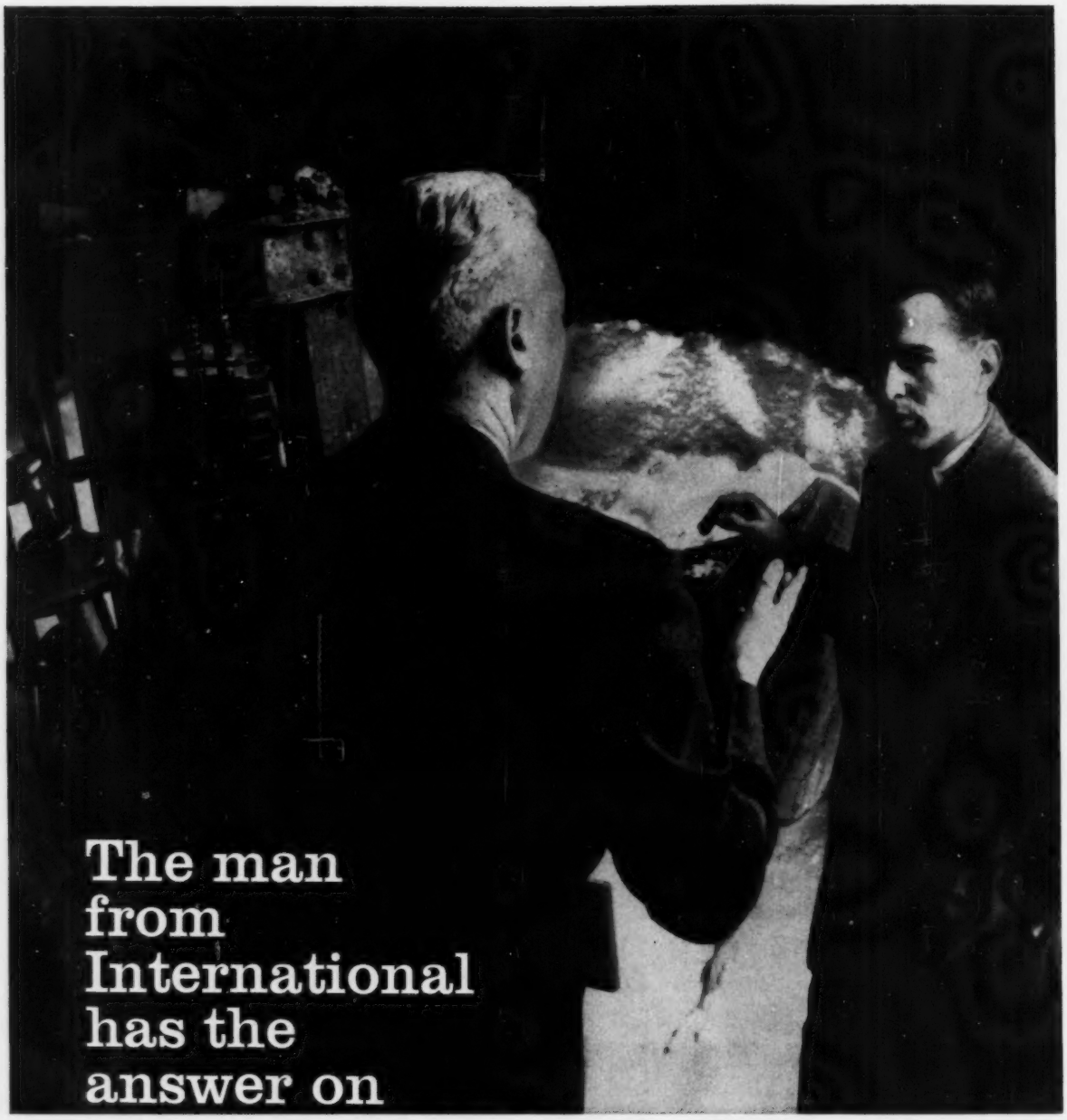

The man from International has the answer on salt handling

A medium-capacity front-end loader proved to be the answer for this salt user. Describing the loader's operating efficiency is the man who recommended it—the International Salt Company sales engineer. Whatever your plant requirements, he can suggest the most efficient method of salt handling—choosing from conventional systems as well as the latest in pneumatic and hydraulic equipment. In many cases, salt-handling problems can be simplified by the installation of a Lixator*, International's exclusive automatic rock salt dissolver. Your local International representative knows which type of Lixator is best for your needs. Contact him, or our nearest district office: Boston, Buffalo, Charlotte, Chicago, Cincinnati, Detroit, Newark, New Orleans, New York, Phila., Pitts., St. Louis. Or write International Salt Company, Clarks Summit, Pennsylvania.

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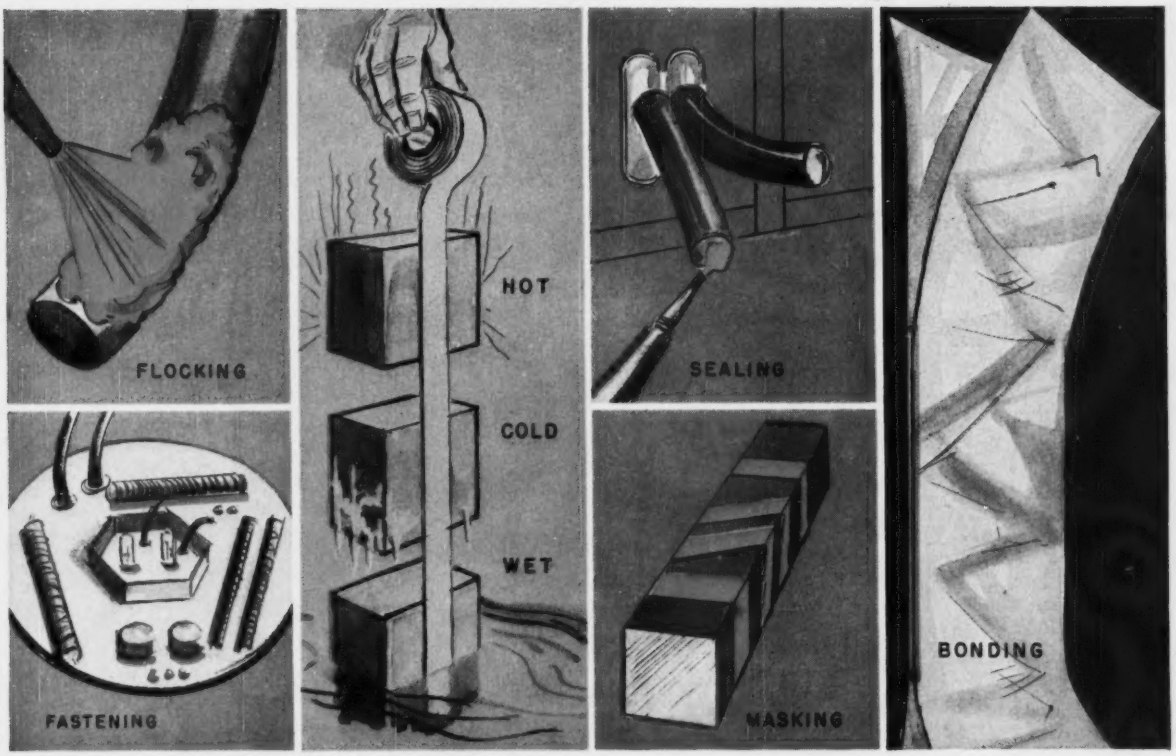
"A STEP AHEAD IN SALT TECHNOLOGY"

SILICONE NEWS from Dow Corning

Wet, Cold, or Hot, They Stick!



Pressure-Sensitive Silicone Adhesives Offer Unusual Properties

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Put 'Em on Tape. Dow Corning silicone adhesives form superior pressure sensitive tapes with backing materials almost unlimited. Many tapes utilizing these adhesives are already commercially available; they include backings such as glass cloth, Teflon, Mylar, aluminum foil, Silastic®, the Dow Corning silicone rubber, and combinations of these materials. Supplied by several manufacturers, tapes made with Dow Corning silicone adhesives find a variety of end uses, depending on the backing material. Some of these are: electrical insulation in aircraft, ships, power plants, generators and appliances; bonding, splicing, and sealing; masking in chemical milling; release surfacing; electroplating.

They Stand Alone, Too. As independent adhesives with no backing tape, silicone resins perform a multitude of functions . . . many more are yet to be discovered. A few examples of current applications: fastening electronic components together; coating ductwork in aircraft, in combination with asbestos fibers for thermal insulation; sealing the ends of heating elements in appliances; bonding aluminum foil to itself for use in cryogenic systems; bonding mica and asbestos panelboard; bonding Silastic to the coils of electrical equipment; assembling small aircraft parts or components.

Versatile. As tapes, sealants, spray-on coatings, bonding materials, splicing agents, or in other applications, Dow Corning silicone adhesives show good bond and peel strength, and exceptional resistance to deterioration. If you manufacture adhesives, tapes, sealants, or any product making use of these materials, you should investigate Dow Corning silicone adhesives.

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AMMONIUM NITRATE SOLUTIONS – NFS-83 and NFS-50. Ammonium nitrate-water solutions containing respectively 83% and 50% NH_4NO_3. For explosives, fluid catalysts, pharmaceutical applications.

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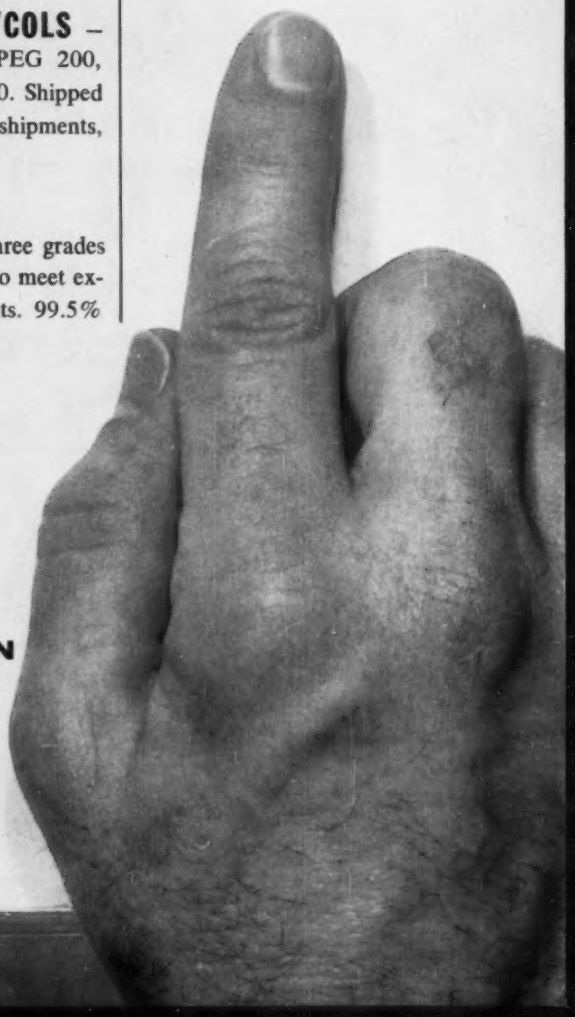
For specifications and local offices, see our insert in Chemical Materials Catalog, pages 475-482 and in Chemical Week Buyers Guide, pages 37-44.



BASIC TO AMERICA'S PROGRESS

Allied Chemical

NITROGEN DIVISION
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New York 6, New York

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Business Newsletter

CHEMICAL WEEK
May 14, 1960

On Texas' Gulf Coast, process industry growth is going strong:

• Air Reduction Co. is about to decide on the size of a new air separation plant, at Houston, where Airco now has a small oxygen plant. The new facility is expected to cost $1.5-5 million; capacity will be 25-150 tons/day of liquid oxygen, 4-25 tons/day of liquid nitrogen, and 1-5 tons/day of liquid argon.

• Along "Chemical Row" near Orange, Big Three Welding Equipment Co. (Houston) plans to build a $1-million air separation plant with pipelines to nearby chemical plants. Daily capacity: 17½ tons of LOX, 17½ tons of liquid nitrogen, 90 tons of gaseous nitrogen.

• At Beaumont, Mobil Oil will build a 20,000-bbls./day delayed coking unit to convert heavy oil into gasoline, light fuel oil and petroleum gases.

•

Investment prospects in Central America continue to brighten, and more U.S. CPI companies are stepping in. Shell Oil has decided to put up a $10-million refinery in El Salvador's Acajutla area to process Venzuelan crude for the projected Central American "common market." A group of international investors put up the capital. Esso will also build a refinery in the area. Last week a newly built $400,000 paint factory was dedicated in San Salvador. Sherwin-Williams supplied the technology. In line with United Nations recommendations, the capital was supplied by Central Americans, included investors from all five republics.

And more progress toward forming the Central American common market was made last week at a meeting in Cost Rica. Internal frictions were smoothed over, and steps were taken to form a $100-million development fund.

In Mexico, Miles Laboratories is ahead in the race for the citric market (*CW, April 2, p. 14*). Miles broke ground last week for its plant, which is designed to make Mexico "self-sufficient" in that chemical. Equipment is slated for shipment this month. Meanwhile, Bzura Chemical—Miles' chief contender—says it is still in the running, although it now says it has not shipped any equipment to Mexico, as previously reported.

•

Shell Chemical's plans to triple polyisoprene synthetic rubber capacity to 120 million lbs./year are moving ahead this week. The firm's Torrance, Calif., plant—birthplace of its polyisoprene production—is expanding to the 40 millions lbs./year originally planned for that unit (*CW Market Newsletter, Feb 13*).

Shell's next step calls for a new, integrated 80-million-lbs/year monomer-polymer plant "at a Midwest location," according to company President Richard McCurdy. Hydrocarbon feedstocks for the new plant will come from Shell's Wood River, Ill., refinery near St. Louis. The plant

is reportedly in an advanced engineering stage now, is expected to start up next fall.

The past year, Shell has been producing polyisoprene—up to 5 tons/day—for evaluation purposes. It expects to complete the California expansion this fall.

•

Canada is stepping up its natural gas export projects to meet predicted shift in energy sources (*see Energy report, p. 63*). Export of more than 200 million cu. ft./day of natural gas to the U. S. Midwest is expected to be under way Oct. 1. And further quantities may be crossing the border at Niagara Falls later in the year. James Kerr, president of Trans-Canada Pipelines, Ltd., told shareholders last week that he expects U. S. Federal Power Commission approval shortly for gas export at the Falls. If approval is obtained by June, he estimates, an additional 50 million cu.ft./day will be exported.

Meanwhile, Alberta Gas Trunk Line Co. Ltd. (Calgary) will raise $30 million by immediate sale of secured debentures totaling $15 million and another $15 million in preferred shares to complete construction of the $72-million Plains Division of its pipeline system. Over-all length of the Plains Division line, leading toward Northern Idaho, is 834 miles; capacity: 731 million cu.ft./day.

General Aniline & Film is mapping a five-year expansion program. It's starting off with a capacity boost at its Calvert City, Ky., plant, which specializes in high-pressure acetylene chemicals. Pyrrolidone and vinyl pyrrolidone capacity will be increased, as well as that of surface-active agents and intermediates formerly made at Linden, N. J. Cost and capacities were not disclosed.

Although GAF never has officially divulged the size of the high-pressure acetylene unit, an earlier estimate (*CW, July 30, '55, p. 56*) pegged the potential at 30-40 million lbs./year. Contract for new construction has been awarded to The Lummus Co., and engineers are already on the site.

Reichhold Chemicals has just completed another acquisition—its third in the past few months. Deecy Products Co. (Cambridge, Mass.), a plasticizer producer, was acquired for an undisclosed number of RCI common shares. Reichhold's two previous acquisitions: Alsynite, manufacturer of plastic panels, and Modiglass Fibers.

And Allied Chemical plans to acquire Specialty Resins Co. (Lynwood, Calif.)—a move that could substantially broaden Allied's line of alkyd and polyester resins. Frank Norton, executive vice-president of Allied's Plastics and Coal Chemicals Division, says the acquisition will provide the division with its first West Coast production facility.

Included in Allied's over-all expansion plans for the West Coast: a plant for phthalic anhydride in the Los Angeles area.

design (dē zīn′) n. A plan; pattern; purpose. Syn. Aim, intention, purpose. A design is something skillfully and methodically planned; it requires time and study

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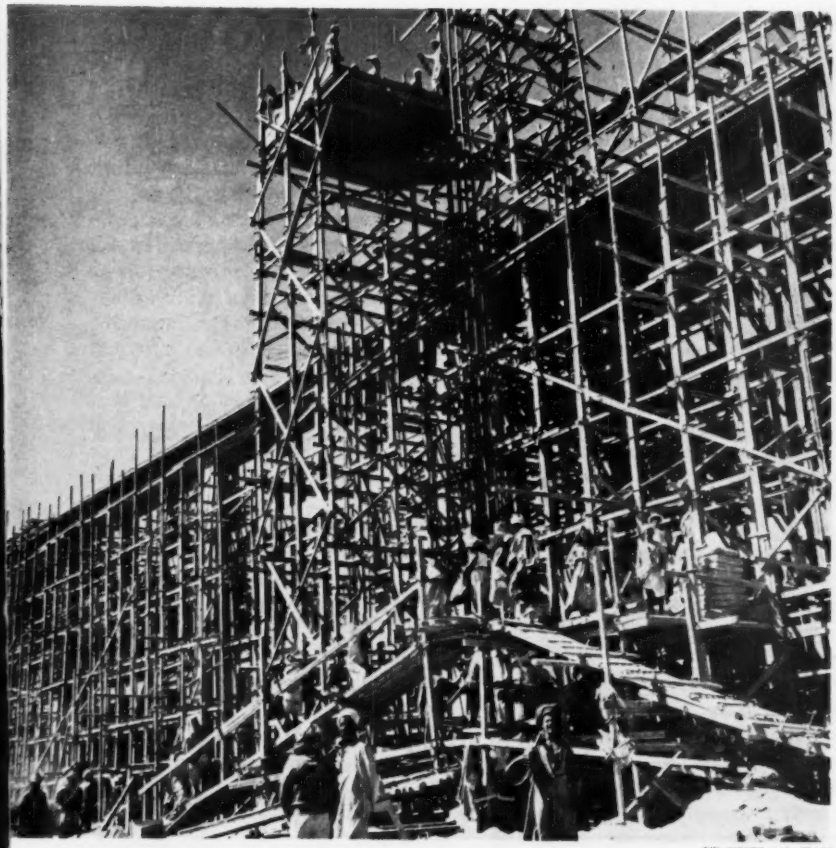
Chemical Week — May 14, 1960



CW PHOTO—AL WAGG

U.A.R.'s biggest chemical project: $67-million fertilizer plant.

Wanted (Now): U.S. Capital

Despite the flare-up between the U.S. and the U.A.R., opportunities for U.S. chemical companies to cash in on the U.A.R.'s economic growth have never been better. Here's an on-the-scene report by CW correspondents in the Middle East news centers.

As local workers heave-to in the second-stage construction of the United Arab Republic's prize chemical project (*picture*), the country is readying for a surge of chemical processing growth. Members of a U.S. trade mission, recently returned from the U.A.R., reported* last week that the climate appeared ripe for U.S. companies to cash in on these ambitious growth plans. But at that time this country's relations with the U.A.R., and the rest of the Middle East, took a sharp turn for the worse, jeopardizing the newly optimistic outlook.

New York seamen picketing the Egyptian ship *Cleopatra* had incited a retaliatory boycott of U.S. ships by unions throughout the Arab world, and extremist factions in the Arab Workers Federations warned that the ban could be extended to all U.S. goods, no matter on whose ships they arrived.

That squabble has passed, but still stirring ire is a recently passed foreign aid amendment that empowers the President to block aid to any Arab nations that engage in economic warfare against Israel. Cairo papers have lashed back at the U.S. So, while the U.S. and other Western nations' firms are stepping back into Egypt, they are moving gingerly.

Dawn for Industry: If it's still impossible to separate business from politics in President Gamal Abdul Nasser's United Arab Republic, at least the business opportunities have never been better.

Generating these opportunities is Nasser's drive to double national income in the next 10 years through development projects outlined in two overlapping five-year plans. The first plan, launched early in '58, is slated for completion at the end of '63.

It's already paying off. In '58, 24 industrial projects costing some $81 million were completed in Egypt alone. They employ almost 9,000 workers, annually produce goods (including concrete, calcium nitrate fertilizer, tires and glass) valued at $55.5 million, save Egypt $30 million/year in foreign exchange.

Last July, 33 more projects were begun, including pharmaceutical, battery and explosives plants. All told, they'll save another $31.4 million/-year in foreign exchange.

Part of the first plan is the $67-million nitrogenous fertilizer plant at the Aswan low dam now being put into operation by Egyptian Chemical Industries Co. (KIMA), a combination government and privately owned company. It's the biggest chemical plant in the U.A.R. to date. First-stage production will be about 380,-000 tons/year of calcium ammonium nitrates (20.5% N). After completion of the second stage in June '61, output will reach 480,000 tons/year. Later, the project may be expanded into the production of heavy water, phosphoric acid, ferromanganese, calcium carbide, and aluminum.

Equipment, installation, and training of local personnel is being supplied (on credit) by West Germany's Uhde and Badische Anilin & Soda-Fabrik, and France's Citra.

Other current chemical projects in

* At the mission's final conference in Chicago.

CW PHOTO—AL WAGG

Minister Sidky: 'Any worthwhile project will be considered.'

the first plan are also being handled by Western contractors. Three West German contractors are building a $24.6-million pulp and paper mill near Alexandria for the government-private-owned General Paper Co. Italy's Oronzo de Nora is building a $6.4-million plant for the government. Initial capacity will be 20,000 tons/-year of caustic soda and 17,000 tons of chlorine.

Still Talking: Other first plan projects are still being negotiated. Still in the talking stage: a $19.3-million, 3,000-tons/year low-pressure polyethylene project, first discussed with the Russians, now being planned with West German firms; a $5-million carbon black plant, also being discussed with West German firms; and dyestuff and motion picture film plants.

The latest deal closed was the Parsons and Whittemore contract to supply and initially operate an 18,000-tons/year cellulose pulp plant for the government.

With some big foreign exchange injections from Russia and East Germany, as well as credits from West Germany and Japan, Nasser has been able to scrape up all the capital requirements for the first plan, and will launch the second one next year.

Big Plans for Chemicals: So far, only the program for the southern region (Egypt) has been drawn up. The government expects to plow in some $1.1 billion. The next-to-the-largest single chunk of this, $138.1 million, will go into the chemical and pharmaceutical industry, including $82.6 million in foreign exchange. The petroleum industry will get $133 million, and metallurgical, $142.9 million.

Petrochemicals will get a big push. Oil fields and refinery capacity are being expanded in both Syria and Egypt. In Egypt alone, crude oil output is expected to rise from 335,670 cubic tons in '57 to 5 million tons/-year by '62. Refinery capacity is being boosted to 5.5 million tons. By the end of '65 (the end of the second plan), Egypt will probably be producing about 400,000 tons of surplus gasoline, including 100,000 tons of light fractions suitable for petrochemical feedstocks.

Recovering natural gas (now wasted) from oil field operations is another major goal.

Mining too is an important area in the second plan. Nearly $110 million has been earmarked for mine development by public and private organizations. Included are iron mine and refinery expansions, boosting phosphate production from 500,000 to 1.25 million tons/year; and building refineries to process locally produced manganese, zinc, copper and lead.

Foreign aid is being sought to step up rare-earth production by the Egyptian Black Sands Co. The production goal is 50,000 tons/year of rare earths, to produce for export 20,000 tons of ilmenite, 6,000 tons of magnesite, as well as zircon, rutile, and monazite.

Glass sands, gold, graphite and coal projects are also on the agenda.

Smiles for the West: To fulfill these plans, Nasser and his U.A.R. government planners have come to realize that they will have to look for less help from countries of the Soviet bloc (which have disappointed the U.A.R. on several projects) and more from the West, including private investors.

This increasingly hospitable attitude toward private foreign investment has been emerging during the past few months, and follows smoother political relations with the West.

Just how far it will extend still isn't very clear. Just last January, President Nasser told correspondents: "We give priority to national capital investment. If foreign investment is required, we would rather get loans."

But not long after that, Nasser told the members of the U.S. trade mission that he seeks as much private investment as possible, that he wants to avoid public ownership in all but a few major industries.

And in an interview with a CHEMICAL WEEK reporter in Cairo, Minister of Industries Aziz Sidky said: "The government prefers to encourage the use of private local capital . . . When this is found inadequate, the government steps into the financing picture and may even call on foreign government aid or foreign private investors. There is no firm policy that specifies where the private, foreign or government capital will operate. . . . Any worthwhile project will be considered, whether or not it is part of the long-term plans."

If the latest outbreak of hard feelings doesn't spread to the government level, Nasser will probably get more U.S. government aid for some of his projects.

Sales Job: To encourage private investments, the U.A.R. recently revived the Investment Law of 1953, which is now interpreted to permit 60% ownership of a company by a foreign parent, gives tax relief for seven years, guarantees repatriation of capital and profits.

But, despite U.S. government efforts to get an investment treaty, Nasser still considers it a slight on his government's integrity to be asked for a guarantee against expropriation.

Nevertheless, foreign companies are beginning to move in. Leading the way are pharmaceutical companies, which can start with a relatively small investment and amortize it quickly. Pfizer's joint venture for antibiotic production, set up late last year, was the first U.S. private investment project in Egypt since Suez. Ciba, Sandoz, Wander, and Hoechst have also formed joint ventures. Hercules Powder is said to be in advanced talks on a large Toxaphene project. It will supply the know-how, perhaps even some capital.

But most U.S. producers still have to be convinced of the wisdom of putting any money into Egypt. As last week's boycott incidents show, political risk is still an element to be considered, although the regime itself is considered the most stable of the Arab world.

And the market—30 million people with a per-capita income of about

Egypt's Chemical Growth . . .

(Metric tons/year)

1965 Production Targets—Plants Not Yet Scheduled

Acetylene	340	Ethylene	22,640
Ammonium nitrate-limestone fertilizer	200,000	Glycerin	17,400
Butadiene	4,690	Hydrochloric acid	10,660
Butane	290	Hydrogen	860
Butylene	5,630	Methane	14,600
Calcium chloride	7,363	Polystyrene	3,000
Dodecyl benzene	3,000	Polyvinyl chloride	5,000
Ethane	3,650	Propane	580
Ethyl alcohol	28,000	Propylene	13,600
		Rubber, synthetic	10,000

Plant Projects Already Scheduled

	Capacity		*Capacity*
Aluminum	5,000	Hydrochloric acid	160
Ammonium sulfate	200,000	Nylon	72
Aniline	570*	Paints	2,700
Benzoic acid	25	Potassium chloride	1,200
Calcium chloride	40	Potassium sulfate	4,000
Calcium superphosphate	120,000	Saccharin	5
Caustic soda	25,000	Soda ash	70,000
Cellophane	600	Sodium citrate	50
Chloramine	1.8	Sodium cyanide (25 tons) and sodium azide (2.5 tons) —military plant	27.5
Chlorsulfonic acid	1,500	Sodium gluconate	4
Citric acid (from molasses)	260	Solvents (two plants)	6,000
Coal-tar products	20,000	Sulfuric acid	500,000
Copper	5,000	Toxaphene	10,000
Dacron, Orlon	1	Trinitrobenzene	750*
Dichloroanilide	160	Triple superphosphate fertilizer	525,000
Ethylene dichloride	75	Viscose fibers	1,600
Ethylene trichloride	100	Vitreous enamel powders	2,000
Ferric oxides	3,000	Zinc, electrolytic	10,000
Graphite, 60% conc.	1,000		
Graphite, 90% conc.	20		

* Operating on single shift.

Will Reduce Reliance on Imports

(In thousand metric tons and million U.S. dollars. Source: United Nations.)

	1955		1958	
	Quantity	*Value*	*Quantity*	*Value*
Inorganic chemicals	61.7	$ 5.5	68.2	$ 7.8
Organic chemicals	1.9	0.6	3.2	1.1
Dyeing, coloring, tanning materials	17.4	6.5	19.2	9.8
Medicinal, pharmaceutical preparations	3.8	17.0	2.5	16.6
Nitrogen fertilizer (synthetic)	420.1	24.9	657.8	39.8
Explosives, chemical materials not otherwise classified	14.0	6.6	29.3	16.3
Total chemicals		**63.4**		**87.0**

$135/year—is too small to support large-scale plants (*see table*).

For a long time, most U.S. chemical industry participation in the U.A.R.'s chemical development will be limited to supplying technology and equipment. This alone, if Nasser's building plans succeed, could mean some attractive deals for U.S. companies. But they will be bucking some tough competition from West European suppliers, who are generally prepared to offer better credit terms and plants scaled to the U.A.R.'s modest needs. Trade mission members advise U.S. companies to get in on the projects while they are still in the planning stage. That goes for nearly all production targets in the second plan. Specifications have been drawn up for only a few projects.

IRC Showdown Near

A showdown in the squabble among the stockholders of Industrial Rayon Corp. appears to be only a few weeks away, with management preparing to call the annual meeting "soon."

Just one week after certain IRC shareholders' violent opposition caused Texas Butadiene & Chemical to withdraw from the proposed merger with IRC (*CW Business Newsletter, May 7*), it seemed that IRC's pro-management stockholder group still holds the upper hand. This bloc has out-voted the dissidents by 1,362,705 to 190,093 shares. Now, if IRC directors decide to book the annual meeting for late May, they will sharply limit the time the dissidents need to campaign for proxies.

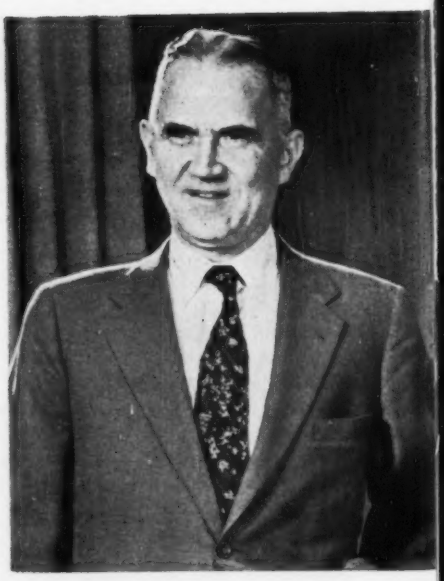
Furthermore, the largest single stockholder — Cleveland's M. A. Hanna Co., which owns 20.6% of IRC's outstanding common stock—indicates it will stand fast behind management. At Hanna's annual meeting last week, Honorary Chairman George Humphrey—former U.S. Secretary of the Treasury—noted that IRC has more than $15 million in liquid assets and that Hanna should protect its interest in IRC "by staying in its management and seeing that our money is not wasted." Hanna's Vice-Presidents William Hobbs and Gilbert Humphrey are members of IRC's board of directors. Hobbs told Hanna shareholders: "We are quite disappointed" that the merger did not go through.

Stauffer's High Cash Flow, Current Assets

Including Victor and other acquisitions. All dollar figures in millions.

	'50	'59	Increase
Sales	124.6	228.1	83.1%
Earnings	15.2	22.2	46.3%
Cash retained*	**14.3**	**28.1**	**96.5%**
Current assets	**27.1**	**90.2**	**232.8%**
Research budget	1.1	4.7	319.0%

* Sum of (a) set-asides for depreciation and amortization, plus (b) net income minus cash dividends.



Stauffer's Hans Stauffer: One prime poser — putting extra funds to work.

Swelling Cash Spurs a Search for Growth

Stauffer Chemical not only has the will to expand; it also has the ability —as the table (*above*) clearly shows. Over the past 10 years, while President Hans Stauffer's company was driving for a place on the roster of the nation's 15 biggest chemical firms, its depreciation set-asides swelled nearly fourfold and current assets increased more than threefold. This week the company drew off some of its overbrimming retained earnings, raised to 100% its stock ownership in the Stauffer-Temescal metallurgical operation (formerly two-thirds owned by Stauffer).

Metallurgy appears to be a prime growth area. Stauffer-Temescal is a leader in the electron-beam furnace field; it designs, licenses and sells equipment, uses five furnaces to do custom smelting for other metals companies and for the government. It is also engaged in developing new, high-temperature metals—e.g., a 90% tantalum-10% tungsten alloy that's expected to be used in rocket nozzles (*CW, March 19, p. 66*). In a 1-million-lbs./year plant at Richmond, Calif., the company produces pentachlorides of columbium and tantalum, conceivably could become an integrated producer of these and other refractory metals.

Staking Claims: But Stauffer's research organization—whose budget this year is being increased 10%, to $5.1 million—also has staked out claims in a half-dozen other major product areas. Work is proceeding in at least three of those fields:

(*1*) *Phosphates.* At Vernal, Utah, a crushing and beneficiation plant is being built for the phosphate rock to be mined there by San Francisco Chemical Co., owned 50-50 by Stauffer and Mountain Copper Co., Ltd. (*CW Business Newsletter, March 26*). The first unit—with phosphorite capacity of 200,000 tons/year—is to be completed by November. Output will go to Western Phosphates, Inc.—owned 50% by Stauffer, 25% by American Smelting and Refining, 25% by Kennecott Copper—for production of phosphoric acid, triple superphosphate and ammonium phosphates. Tentatively, the 205-mile haul to Garfield, Utah, will be made by truck, but word is that one of two Western railroads—Union Pacific or Denver & Rio Grande—may decide to build a spur line to Vernal.

(*2*) *Soda Ash.* In southwest Wyoming, Stauffer is proceeding with preparations for a possible trona mining and refining project. The company says it now sees a way to develop its trona deposits there without conflicting with two other activities proposed by others for the same area: irrigation farming, slated to follow construction of Fontenelle Dam by the U.S. Bureau of Reclamation; and oil shale mining, contemplated by a pair of Denver geologists. Stauffer management says market studies have been completed. A drilling program is under way to determine where to locate the mine shaft and plant, and an appropriation request is being readied for the board of directors.

(*3*) *Plastics.* At Vernon, Calif., Stauffer has been building up the plastics business of its Molded Products Division. It recently purchased two small operations that turn out expanded polystyrene for insulating and packaging, and injection-molded and extruded thermoplastics for pipes, tubes and shapes. Planned: a new line of polyvinyl chloride pipe and tubing; production and sale of proprietary and customer-brand extruded products. In preparation for entry into resin production, Stauffer has been actively studying processes, markets, plant locations, investments and rates of return. Right now it doesn't seem to be close to a go-ahead decision. But if the Molded Products Division begins to score well

on any of its newer lines, this could weigh heavily in the choice of which resin (or resins) to produce. Incentive: the relatively high profitability that usually goes hand in hand with vertical integration.

Up until a few months ago Stauffer had been planning to ease into polyvinyl chloride production through American Chemical Co. (Long Beach, Calif.), owned 50-50 by Stauffer and Richfield Oil. Then it was decided to transfer the polymerizing operation to Goodrich Chemical (*CW Market Newsletter, Jan. 30*). The American Chemical plant is onstream, turning out vinyl monomer and other chlorinated hydrocarbons.

Four Other Fields: Further illustrating the company's diversified interests are the construction, production and research and development operations going on in four other prospective growth areas.

In metallo-organics, Stauffer's wholly owned Anderson Chemical Co. division (Weston, Mich.) recently completed new units for production of aluminum aspirin and vanadium oxychlorides. Anderson also owns a new laboratory building and pilot-plant area. Texas Alkyls, Inc., jointly owned by Stauffer and Hercules Powder, is reportedly producing aluminum alkyls for catalysts and pyrophors at more than the designed capacity rate of its plant. This plant, in Houston, went onstream last November.

In agricultural chemicals, Stauffer has suffered at least a temporary setback on its Eptam weed-killer, but feels that its Trithion insecticide, Vapam fumigant and Captan fungicide have made good headway. New, biologically active analogs of these products are regarded as promising; and Stauffer feels that Eptam can do a good job if it's properly used.

The company seems confident that it holds some trumps in the high-energy fuels game. Its Stauffer-Aerojet affiliate is continuing research and development on boron fuels for the Air Force. Its process for one such product has been a success in pilot plant trials, according to the company. Also, Stauffer researchers claim a new process for production of nitrogen tetrafluoride, another high-energy chemical.

In phosophorus products, the company is expanding its Victor Chemical Works Division by building a new plant at Chicago and adding new units to the Mount Pleasant, Tenn., plant. Several newly synthesized organic phosphorus compounds are being evaluated for industrial and agricultural applications, and new processes have been developed for phosphorus compounds used in detergents production.

Market Threatened: Rayon poses one big question for Stauffer. The firm and two 50%-owned affiliates have long been major producers of carbon bisulfide, which goes mainly to the rayon industry. Some years more than two-thirds of the output has gone into rayon manufacture. With nylon in control of a big share of the tire cord market, segments of the rayon industry are in trouble. Stauffer's hope: that the carbon bisulfide business will be buoyed by rising demand for cellophane and by continuing demand for rayon staple in apparel fabrics.

Despite the uncertainty, Stauffer's biggest expansion project this year is a new carbon bisulfide plant. This plant—expected to take about $12 million out of the company's $22.5-million capital spending budget for '60—is due onstream late in the year at Delaware City, Del. But it's a replacement for outmoded units at several other locations, rather than new capacity; and it's said to be a particularly efficient operation. It will use the methane-based process employed at Stauffer's LeMoyne, Ala., plant.

This raises the question of the company's over-all operating efficiency. Although its recent profit margins have been well above the industry average, they are decidedly less than the handsome 12.2% earnings-to-sales ratio recorded 10 years ago. And while Stauffer's 60 domestic plants were strategically designed and located as of the times of construction, it's probable that the company would be better off with somewhat fewer, but larger and more efficient, plants.

The Delaware City project—undertaken in the face of a decline in the carbon bisulfide market—indicates that over-all plant modernization will be getting much attention as Stauffer executives deploy the liquid assets that have been pouring in each year. Even so, it's a good bet that the merger and acquisition habit will be hard to break.

Switch from Equity

Two producers of chemicals and specialties this week are banking largely on senior securities in proposed public offerings to finance current expansion plans.

• Witco Chemical Co. (New York) — which started construction of a $1.6-million detergents plant in Chicago in February (*CW, Feb. 27, p. 43*) and joined in March with Richfield Oil Corp. to build a $1.75-million dodecylbenzene plant (*CW, March 12, p. 31*) — has filed with the Securities & Exchange Commission for sale of $8 million worth of sinking-fund debentures due in 1980. Proceeds will be used to finance its current construction and expansion program for which expenditures of $10 million have been authorized. Heading the underwriters: Goldman, Sachs & Co.; Smith, Barney & Co.

• Baltimore Paint and Chemical Corp. (Baltimore, Md.) is seeking SEC approval on a mixed offering intended to bring in approximately $2.85 million. The offering would include 90,000 shares of 6½% cumulative convertible first-preferred stock (par value $20/share); $750,000 worth of sinking fund debentures, with attached warrants for purchase of a total of 30,000 shares of common stock at $9.25/share on or before March 1, '64; and 85,000 shares of common stock (par 50¢).

Baltimore wants the money for three major projects: (1) it will pay back $230,000 it used to buy M. J. Merkin Paint Co., Inc. last July; (2) it will spend $1,135,000 for land and buildings it now leases from two companies controlled by members of the Shuger family (principal owners of Baltimore Paint and Color Works until its acquisition by Baltimore Paint and Chemical in mid-'58 and who now hold principal executive positions in the company); (3) it will spend $500,000 for additional facilities and $100,000 for additional equipment.

In '59, Baltimore Paint and Chemical sales totaled nearly $12 million; it netted $473,622. The company manufactures paints, enamel, multicolor lacquers and traffic-marking paints. Annual production is about 4.5 million gal./year; planned new facilities will bring total capacity to 5.5 million gal./year.

COMPANIES

Radorock Resources, Inc., and Federal Uranium Corp. have approved merger of the two firms into the newly formed Federal Resources Corp. (Salt Lake City). Under merger terms, stockholders of the two companies will receive one share of Federal Resources for each share held of Radorock and Federal Uranium. The new firm has capital assets totaling $20 million.

•

Seiberling Rubber Co. of Canada, Ltd., has purchased the tread rubber business of Gutta Percha and Rubber, Ltd., which recently liquidated *(CW, May 7, p. 25)*. Seiberling will continue manufacture of tread rubber under the Gutta Percha Duratread formula.

•

Narmco Resins & Coatings Co. will now be known as Narmco Materials Division of Narmco Industries. The San Diego parent firm recently became a wholly owned subsidiary of Telecomputing Corp. (Los Angeles).

•

Enjay Co., Inc., on May 31 will become the Enjay Chemical Co., newest division of Humble Oil & Refining Co. Previously merged into the new Humble company: Esso Standard, Carter, and the former Humble concern. The Enjay Division will handle all marketing of chemical products, coordination of supplies and chemical research programs, and recommendation of new location and nature of new chemical investments, but will not manufacture.

EXPANSION

Primary Magnesium: Alabama Metallurgical Corp., jointly owned by Calumet & Hecla (Chicago) and Brooks & Perkins (Detroit), will increase its magnesium capacity at Selma, Ala., from 6,000 to 12,000 tons/year. Expansion plans call for 10 additional furnaces, based on expected increasing demand for magnesium and AMC's process for ferrosilicon reduction of Alabama dolomite.

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Plastic Containers: Plax Corp. (Hartford, Conn.), jointly owned by Monsanto Chemical and Emhart Mfg. Co., has purchased a 12-acre site near Cincinnati, O. for construction of a $1.25-million plastics container plant.

•

Sulfur: Arkansas Louisiana Chemical Corp., subsidiary of Arkansas Louisiana Gas Co., will begin extraction of sulfur from hydrogen sulfide contained in natural gas June 1 at its new Hamilton plant near Magnolia, Ark. The $85,000 facilities will use the Claus process. Present plans call for production of sulfur in a molten state to be stored and sold in either molten or solid form.

Pesticides: Niagara Chemical Division of Food Machinery and Chemical is adding two new pesticide plants this year: one at Ayden, N.C., and another at South Haven, Mich. The first unit is to be completed this spring; the Michigan unit, later this year.

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Aspirin: Monsanto Chemical is adding 25% more capacity to its aspirin production unit at St. Louis. Scheduled for late summer operation, the new capacity is being installed in a highly instrumented and semi-continuous production unit completed less than five years ago as 40% larger replacement facilities.

•

Capital Improvements: Eastman Kodak will spend $33 million for Kodak Park, Rochester, N.Y., facilities this year. Included in the program: a new paper mill, film-emulsion coating-alley structure, new printing department building and distribution center.

FOREIGN

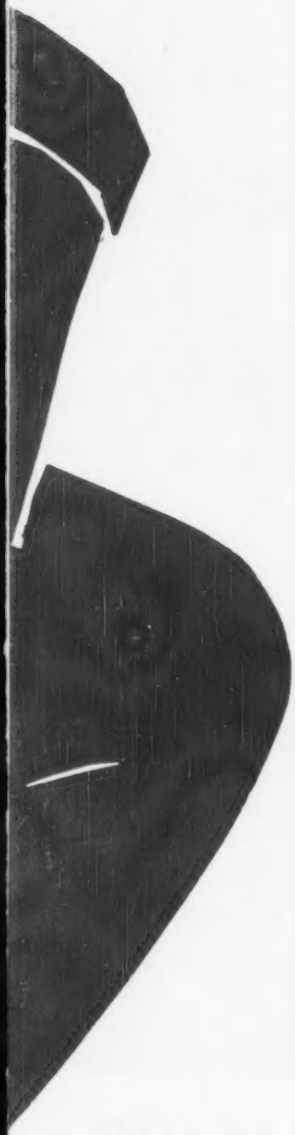
Petrochemicals/Mexico: Recently issued is the first specific listing of petrochemicals that are to be reserved for exclusive development by PEMEX, the Mexican government oil monopoly (*CW, Nov. 28, '59, p. 47*). The list includes: ethylene, propylene, polyethylene, polypropylene, dodecylbenzene, toluene, benzene, xylene, styrene, butadiene, methanol, isopropanol, ethyl chloride, ethylene dichloride, cumene and ammonia. And the Mexican government has purchased Impulsora de Empresas Electricas, subsidiary of American & Foreign Power Co., for $106 million. The U.S. parent company will keep a unit in Mexico as an investment and financing institution, with petrochemicals topping the investment list.

•

Phenol/Holland: Dutch State Mines and Dow Chemical (Midland, Mich.) jointly will build a phenol plant near Botlek, west of Rotterdam. The 50-50 venture will use a "new American process based on oil." Although further details on the process are not available, it's presumably the two-stage oxidation process based on toluene, which Dow will use in its new Kalama, Wash., phenol plant (*CW, March 26, p. 109*). States Mines will use the phenol for nylon manufacture by AKU, the Netherlands fiber-producing firm. Startup target: within two years. And Dow also is opening two new marketing branches: Deutsche Dow Chemie GmbH. (Frankfurt, Germany) and Dow Chimica Italiana (Milan, Italy).

•

Organic Chemicals/Australia: Consolidated Chemical Industries Pty. Ltd. (Lidcombe, New South Wales) is seeking a joint venture with a U.S. firm to produce organic chemicals and related products. It now makes chloropicrin, thioglycolic acid and its salts, ethyl bromide, saccharin, zinc chloride.



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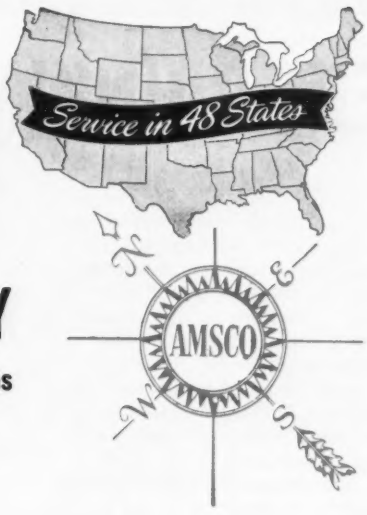

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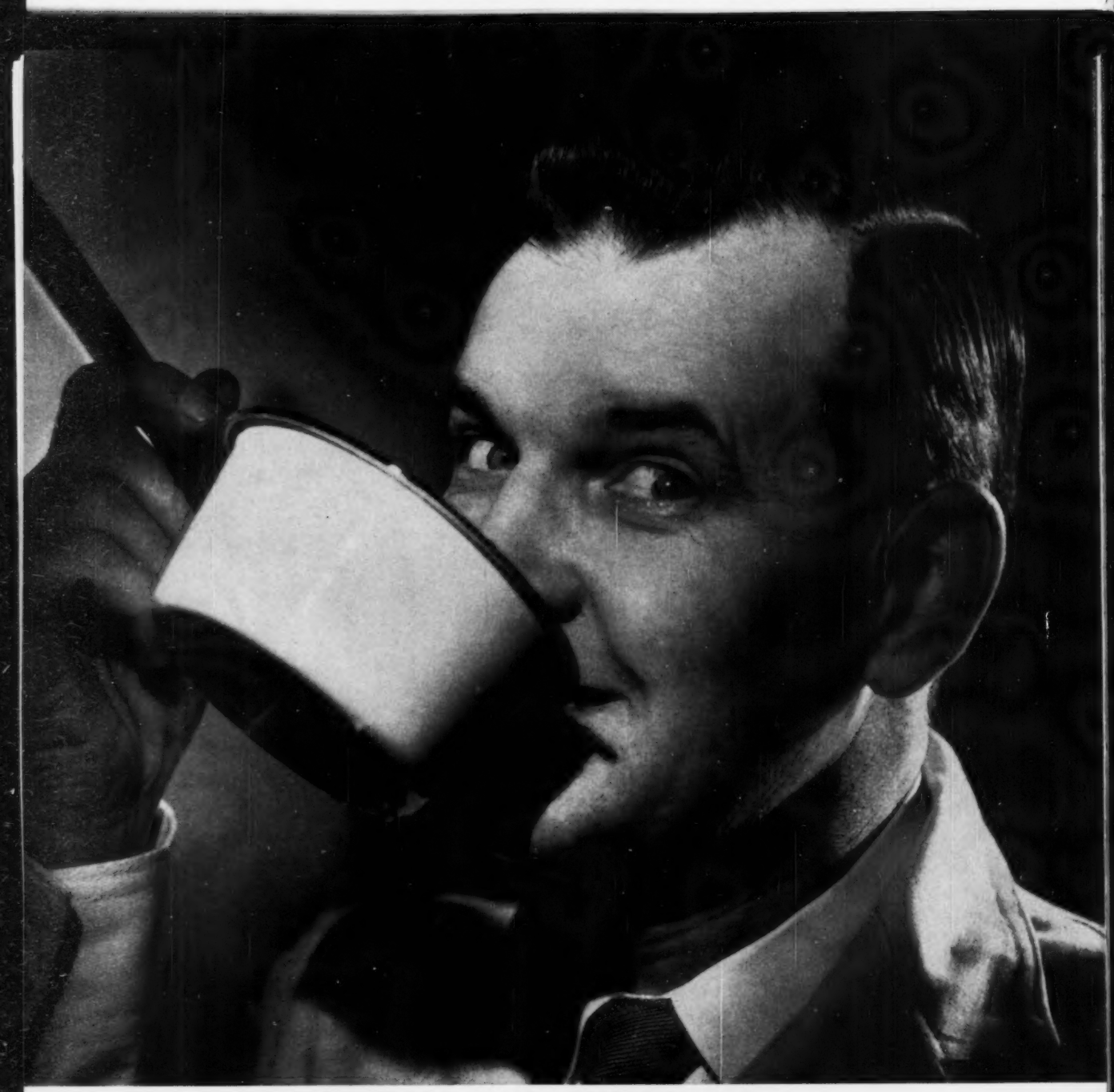

HE'S DRINKING A CORROSIVE LIQUID

It's only a drink of water, but it can be highly corrosive—the water source determines to a great extent just how corrosive it is.

Ground water from Utah, for example, is chemically different than ground water from New York . . . different enough to require a pump of different material to handle it most economically. In fact, there's nothing simple about handling water. Salt water, brackish water, hot water—each calls for a different pump material for best performance and longest pump life.

Take another example—distilled water. It's harmless to drink but it can eat the heart out of a pump. Distilled, deionized or demineralized water tends to corrode ordinary metals, and in doing so, the water becomes contaminated. In fact, the purer the water, the more corrosive it is. Worthington uses "Worthite"—a "super stainless" steel—to resist this corrosion and prevent contamination. Worthite will last indefinitely on distilled water service.

We at Worthington have accumulated a virtual encyclopedia of facts about water handling. Long years of experience have taught us how to select the proper pump for all types of water (or any other liquid) handling applications.

The next time you have a water handling problem, call Worthington—the manufacturer whose name is synonymous with pumps. You'll find your nearest Worthington district office or distributor in the yellow pages. Worthington Corporation, Harrison, New Jersey. 20-15

WORTHINGTON

Plant air conditioning can pay off if any two of these situations exists:

- **Worker density in a plant area is 1 or greater per 300 sq.ft. of floor space.**
- **Yearly labor cost, including fringe benefits, equals $25/sq.ft. of floor space.**
- **Labor turnover is 15% or greater.**
- **Labor cost is 25% or more of manufacturing costs.**

Air Conditioning Pitches for Plant Sales

The guide to payoff on plant air conditioning shown above is part of a new sales pitch by Carrier Corp. It will be one of many that chemical plant managers will see, as the weather warms and air-conditioner manufacturers begin their first hard push for industrial plant sales. And the combination of new data, improved techniques and equipment should make them all worth looking at.

For example, Carrier's figures show that for an average annual outlay of 55¢/sq.ft. of building floor space (the cost of owning and operating air conditioning equipment, *see box, below*), the increase in profit as a result of greater worker output may range from 26 to 120%. Or, the increase in profit can be realized with an air-conditioning cost of only about 1.35% of yearly wages.

These figures are a good indication of why a Trane Co. survey led to a prediction that this year 40% of new factory buildings and 10% of old ones in Atlanta will be air conditioned; in Dallas, 74% new and 50% old, and in Houston 70% new and old. By '80, the prediction goes on, almost every factory in these three cities and in New York will be air conditioned.

But right now air-conditioner producers must push for industrial sales. One estimate is that only 5% of U.S. factory buildings are air conditioned. Just what percentage of chemical plants are air conditioned is difficult to say, but in some areas it is fairly high.

Many plant shops and control rooms in the Southwest have been air conditioned for a number of years (*CW, Aug. 4, '56, p. 72*). Both Humble Oil and Shell Chemical report increased worker efficiency and better employee relations, especially in the machine shops.

In control rooms safety is increased as hazardous gases are kept away from electrical equipment. And the elimination of high humidity cuts damage to instruments, fouling of electrical contact points.

In synthetic fiber, plastics, film and pharmaceutical plants air conditioning has proved particularly helpful in maintaining product quality. For example, Pfizer reports that 30-40% of its plant areas are air conditioned—some with the additional protection of complete sterility, which means recirculated air can't be used.

The plant manager at one pharmaceutical market's plant points out that worker comfort is an important reason for air conditioning sterile rooms. "We have to take all kinds of precautions to get uncontaminated workers into the rooms. Without air conditioning we'd lose out because those sterile gowns that have to be worn can get mighty uncomfortable during a shift," he says.

Outgrowing Its Youth: But many plants still consider air conditioning a luxury. "We haven't completely outgrown many plant managers' youths. They remember when air conditioning was only for movie theaters. When they think in terms of their plants, they picture complete air conditioning. This is usually too costly to be practical, so the air conditioning doesn't get beyond the office," says one air-conditioning manufacturer.

Plant areas must be considered on an individual basis. Carrier Corp. suggests that air conditioning should be given consideration if the investment cost per person in any plant area is between $300 and $1,000. As a limit for maximum investment, the

How much plant air conditioning costs*

Total initial investment per worker	$400
Initial investment per square foot of floor space	$1.75—$5
Yearly cost of owning equipment (principal, interest, insurance, taxes) per square foot	40¢
Yearly cost of operating per square foot	15¢

*Sources: Carrier Corp. and Minneapolis-Honeywell.

firm suggests that the cost should not be greater than one-quarter of the gross annual wage payout for any plant area under consideration.

But it also points out that for chemical plants with an excess of low-pressure steam (20 psi. or under) air conditioning can help to balance power plant heat loads. For example, careful integration of refrigeration equipment into the heating cycle at Parke, Davis' Detroit plant boosted in-plant electrical generation during summer months. It would have cost P-D $25,000/year more to cool by a method not tied to excess steam use.

Gas turbines, showing up in a number of chemical processing jobs, may be integrated with a cooling system. As several gas turbine makers point out, some installations now aren't economical because the excess heat from the turbines is wasted (*CW, Jan. 31, '59, p. 54*). Clark Brothers, in a study with its Mark TA gas turbine, has shown that exhaust gases can be used effectively to generate steam or hot water for a steam turbine-centrifugal chiller or a lithium bromide absorption chiller.

Energy Balancer: The gas industry, which has been looking for summertime uses to help balance its production of natural gas, has sparked considerable research in gas-fired air-conditioning systems (*see CW Report on Energy, p. 63*). As large users of natural gas, many chemical plants may find gas-fired units more economical to operate than electric-powered ones.

Companies such as Arkla-Servel Air Conditioning Corp., York Corp. and Carrier are offering gas-fired lithium bromide absorption units. Southwest Research Institute is preparing to run tests on a new gas-fired unit that is air cooled rather than water cooled (*CW Technology Newsletter, April 23*). It might prove useful in areas where water is short in summertime. The unit uses double-effect evaporation for the lithium bromide solution, which improves performance over single-effect systems by more than 25%. SWRI is also researching the use of infrared-type burners, such as the Schwank (*CW, Feb. 8, '58, p. 66*), Van Dorn and Pyrocore reactors, for the first stage.

Arkla has introduced a 3½-ton unit* that can be used as a chiller or combination heater and chiller. The unit is suited for outdoor installation.

Trane will market an absorption unit for large buildings that is powered by low-pressure steam, uses water as a refrigerant.

Ammonia is still generally considered as the best refrigerant, but it is used in high-pressure systems that require licensed engineers — and leaks are always a hazard. In some states, licensed engineers aren't needed for Freon systems up to 100 tons. Engineers aren't needed for operation of lithium-bromide absorption units, but tonnages seldom go above 700-1,000 tons.

Engines and Pumps: In the small-tonnage field, Ready Power Co. and The Weatherbuster Corp. offer natural-gas engine compressor units. Caterpillar Tractor is introducing a natural gas-driven engine, two of which can be operated in tandem for larger capacities to compete in the 150-900-ton field.

The free-piston engine compressor developed under American Gas Assn. sponsorship (Battelle Memorial Institute did considerable free-piston engine work) is now in the final development stages at Robertshaw-Fulton. It should offer low initial and operating costs for small-tonnage gas-fired installations.

York is completing development of a gas engine-driven heat pump for both cooling and heating. And in areas where electric power is cheaper than gas, the latest electrically driven heat pumps will also cool.

Carrier and York are offering hot-water systems to be used with absorption equipment. Carrier points out that for a given volume, hot water has more heating value than steam. For example, at 300 psi., 1 cu.ft. of water cooled from 340 to 190 F liberates 8,400 Btu.; saturated steam condensing at 340 F, then cooling to 190 F yields only 300 Btu. Boiler-room costs are higher, but pipe sizes are smaller and the system is positive draining. No traps and condensate receivers are needed. Heat transmission losses average about 6%, compared with 10% in steam distribution, according to Carrier.

But steam turbines of the condensing type are generally considered

* Although there was pressure to use Btu. ratings for air-conditioning equipment, the move didn't take and most companies are still using ratings in tons rather than in Btus.

Which of these 3 products and services can you use from BECCO?

TECHNICAL BULLETINS DESCRIBING H_2O_2

We got 'em—
You can have 'em—
They're FREE!

Years of experience in working with Hydrogen Peroxide have produced a wealth of information on this valuable compound, its properties, and reactions. Much of this information is available virtually exclusively from Becco. We've compiled a number of Technical Bulletins, which are yours free on request. Simply decide which ones you want, and mail the coupon below.

No. 2—Hydrogen Peroxide (general information)

No. 41—Becco H_2O_2 35% HP (high purity)

No. 42—Becco H_2O_2 35% Formula D (for preparing dilute solutions)

No. 46—Concentrated H_2O_2 (over 50% concentration)

No. 70—Becco Hydrogen Peroxide SP "100" (Super Pure, of virtually 100% concentration.)

Where can you use these *other* Becco PEROXIDES?

By "other", we mean "Other than Hydrogen Peroxide". Lots of otherwise knowing people labor under the impression that Becco makes only H_2O_2. Actually, there are quite a few "other" useful peroxides in Becco's catalog, some of which are especially suited to high-temperature oxidation reactions.

Look over the list below. Give you ideas? Remind you of a problem you've got? Either way, a note to Becco will bring you more information. Or, use the handy coupon.

UREA PEROXIDE—for use in hair dyeing and cold waving, disinfectants, hypo eliminators, and as a source of water-free H_2O_2.

SODIUM CARBONATE PEROXIDE—for compounding detergents and adhesives.

SODIUM PERBORATE—for use in dyestuff development, detergents, tooth-powders; as a mild bleaching agent and cold wave neutralizer.

CALCIUM PEROXIDE—for dough conditioning and in high-temperature oxidation reactions.

MAGNESIUM PEROXIDE—an antifermentative, for compounding antacids and laxatives.

ZINC PEROXIDE—for use as a disinfectant and deodorant in dusting powders, ointments, etc.

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Over 100,000,000 pounds of plasticizers have been made with Becco proved-in-production epoxidation processes, using Becco H_2O_2!

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Dept. CW-M

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Please send me the free Technical Bulletins checked below:

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uniform quality
steady supply
prompt delivery

It all adds up to...

for

ETHYL ALCOHOL
ETHYL ACETATE
BUTYL ALCOHOL
BUTYL CHLORIDE
BUTYL ACETATE
ACETONE
ACETALDEHYDE
ACETIC ACID
AMYL ACETATE
REFINED FUSEL OIL
ISOAMYL ALCOHOL
PROPRIETARY SOLVENT

PRODUCTION

ideal because they can handle wide fluctuations in demand. Turbine-driven centrifugal compressors operating on high-pressure steam with absorption equipment for utilizing low-pressure steam are also highly regarded.

Environmental Engineering: With a number of air-conditioning systems now becoming available, no simple method of selection is possible. The economics of each situation is the determining factor, and often the solution doesn't involve air conditioning in its usual sense (the term "environmental engineering" is used).

For example, Carrier recommended radiant cooling for dropping temperatures in the furnace area of one plant from 2300 F to 80 F. The technique: pushing the air through a protective-shield panel set up near the surface of the furnaces. The combination of shielding and air movement dropped the temperature.

By stratifying air with fans in some process areas, it is possible to cut air-conditioning costs as much as 25%, according to Carrier.

T. F. Hatch at the University of Pittsburgh points out that conditions in industry are rarely hot enough to be fatal—and a hot process, by definition, is one that can't be made entirely comfortable. But safe tolerance limits have to be established.

Du Pont, Eastman Kodak and others have done considerable work in defining "effective temperatures" for work, based on the rise in body temperature during exposure. For example, the effective temperature for a typist can be higher than for a carpenter.

Often, rest periods in air-conditioned rest areas eliminate need for the costly air-conditioned plant areas. Du Pont, for one, uses air-conditioned rest areas as a partial solution of its ventilation problems in the sodium shops at its Niagara Falls plant. The complete solution involves improving ventilation in the shop areas, too (*CW, Nov. 9, '57, p. 45*).

Protective clothing, ventilated suits and partitioned areas into which cooling air can be blown are solutions of problems created by temporary work in hot plant areas.

Some process areas will always be hot. But with equipment makers putting new emphasis on industrial plant air conditioning, it looks as if working temperatures are on the way down.

EQUIPMENT

Grouting: To prevent seepage in construction and mining operations, American Cyanamid Co. (30 Rockefeller Plaza, New York 20) is offering AM-9 Chemical Grout. The grout, which contains acrylamide, is injected as an aqueous solution into the soil or rock formation, forms a gel that prevents passage of water and binds the soil and rock together for a moderate increase in shear strength. Gelling time is controlled by catalyst addition. AM-9 can be used to seal wells, tunnels, mine shafts, cofferdams, sewer-pipe joints, open excavations and underground curtain walls. It is not recommended for increasing load-bearing characteristics of soils.

•

Insulation Stripper: Hendrix Wire and Cable Corp. (Milford, N. H.) is out with a new tool for stripping thermoplastic insulation, such as high-density polyethylene and rubber, from power transmission cables. The tool is heated, has V-shaped blade to make a circular cut through the insulation. A claw bar on the end of the 12-in. long, 3-lb. tools snaps loosened insulation away from the conductor.

•

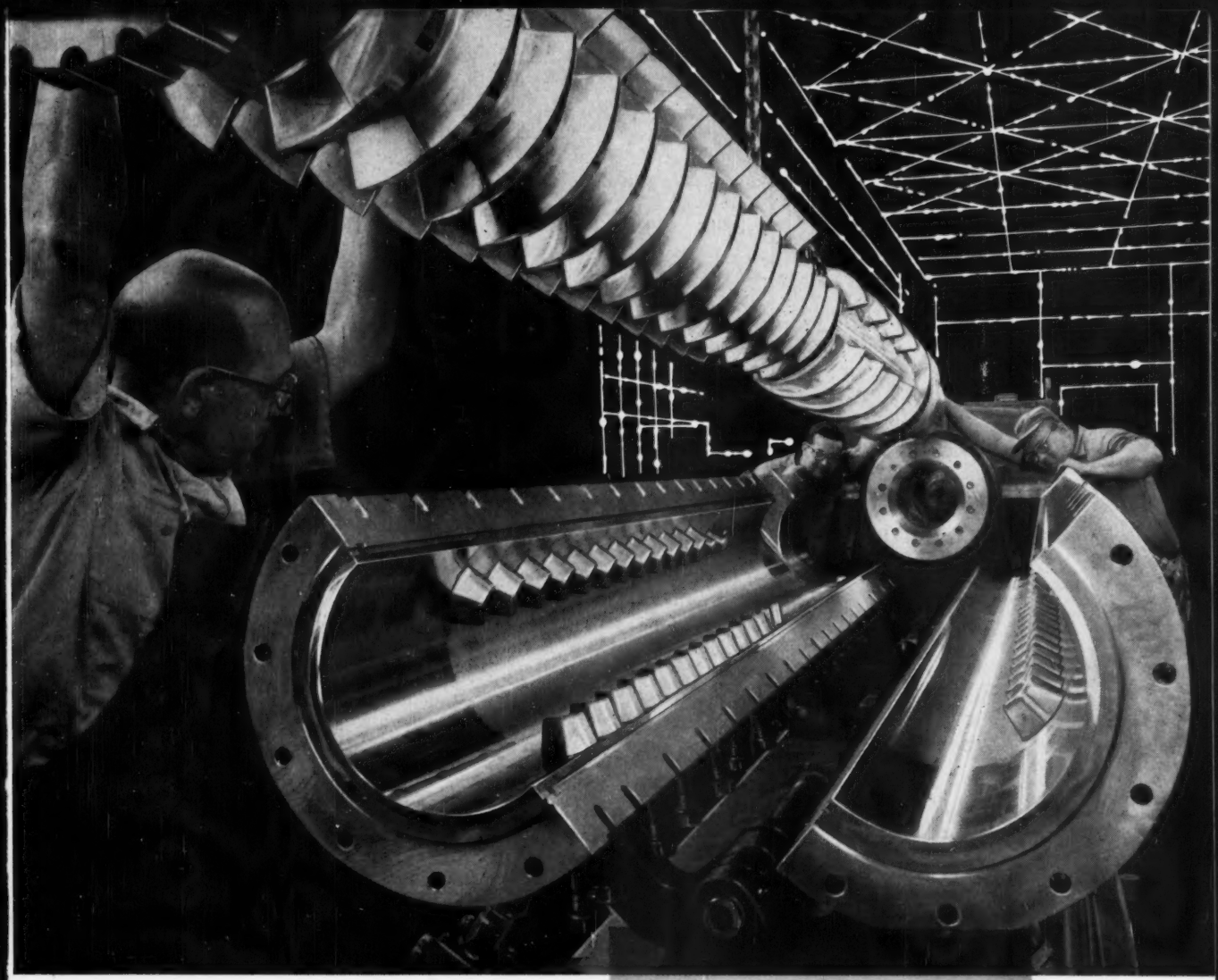
Overcurrent Trip: Allis Chalmers (Milwaukee 1) says its new static overcurrent trip device for its Type LA low-voltage circuit breakers provide greater accuracy and reliability than oil and air time-delay devices. The tripper has no moving parts; timing and tripping are controlled by transformers mounted on the circuit breaker. Pickup current can be adjusted over a wide range (e.g., a 600-amp. breaker can be set to trip between 480 and 1,200 amps.) with a screw-driver.

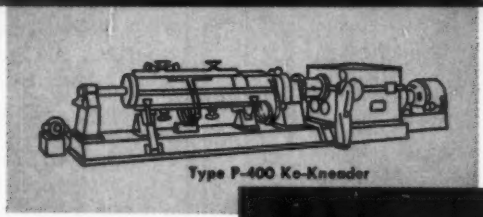
•

Ceiling Insulation: Reflectal Corp.'s (200 South Michigan Ave., Chicago 4) new Alfol aluminum-foil reflective insulation blankets can be used as a maintenance-free ceiling in buildings where no permanent ceiling has been installed. The foil-layer blankets reflect 97% of radiant heat, block convection currents, according to Reflectal. A vaporproof backing protects against condensation. Blankets can be stapled together.

•

Liquid Meters: Two liquid meters, one for automatic batch measure-



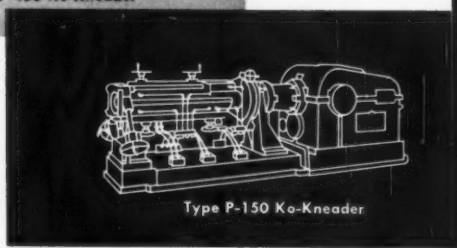


B·P

KO·KNEADERS (LIST SYSTEM)

precision built for efficient continuous mixing

Precision built and skillfully engineered Baker Perkins Ko-Kneaders will convert your inefficient batch process to faster, more continuous operations. Less floor space is required and maintenance costs are materially reduced. With a Ko-Kneader, you not only get more production at less cost, but you give your customer a superior product, too.



B-P Ko-Kneaders are now mixing a wide variety of products such as plastics, carbon electrodes, food specialties, floor tile, solid rocket propellant fuels and many others. From this experience, proper recommendations can be made for your operation. However, if a new mixing problem is involved, test demonstrations can be arranged in the Baker Perkins Laboratory. Write today for engineering manual K-57 or contact your nearest Baker Perkins sales engineer.

BAKER PERKINS INC. CHEMICAL MACHINERY DIVISION
SAGINAW, MICHIGAN

393

PRODUCTION

ments of corrosive liquids, the other for small flows, are new products for fluid-handling applications.

The batching meter, offered by Neptune Meter Co. (19 West 50th St., New York 20) has a capacity range of 20 to 100 gpm. Buttons on the register face set the quantity of liquid, open the valve. Flow is cut off automatically when preset quantity is reached. The meter, for 1½-in. pipelines, is made of stainless steel.

The small-flow meter, offered by the Buffalo Meter Co. (Buffalo, N.Y.), is for ¾-in. lines. Internals are made of stainless steel; outer casing is made of cast iron, stainless or carbon steel.

•

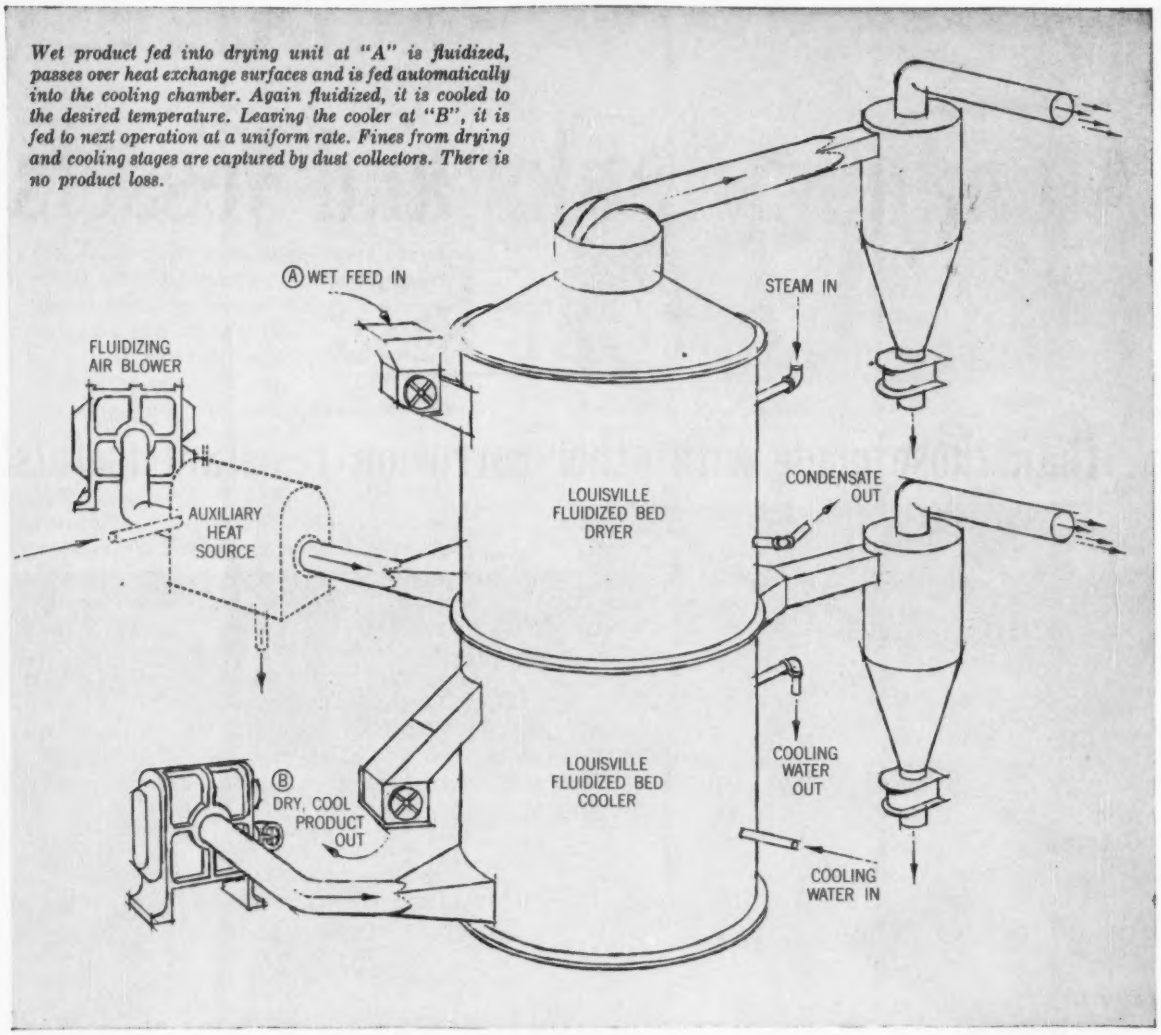
Brinemakers: The Morton Salt Co. (110 North Wacker Drive, Chicago 6) has added two new Brinemakers to its Model E Series. Model E-S is made of extra-heavy, low-carbon stainless steel; fittings are made of stainless steel and brine-inert plastic. Model E-P is an all-plastic unit that permits viewing of salt supply and liquid level through the tank wall.

•

Cartridge Filters: Bendix Filter Division of Bendix Aviation Corp. (434 W. 12 Mile Road, Madison Heights, Mich.) is offering a new line of general-purpose filter assemblies for fuels, lubricating oils, hydraulic fluids, other liquids and gases. Called Series 3100, the filters have pore-size ratings from 2 to 100 microns, are available in five materials, including woven wire cloth, sintered bronze and resin-impregnated cellulose sheet, washers and ribbons. The filter assemblies have a rated operating pressure of 150 psi. with a burst pressure of 600 psi. Temperature range of the elements: —350 to 350 F.

Conveyor: A new materials-handling system that uses low-cost prestressed concrete channels as the conveyor support has been developed by the Frank J. Madison Co. (607 Market St., San Francisco 5). The system's U-shaped beams are inverted for a protective cover for belt, drive, idlers and material being conveyed. Inserts for the idler attachment are cast in the channels, eliminating the need for steel hangers. Comparative studies for the first installation, a 1½-mile system, show savings of 40% over conventional steel construction.

Wet product fed into drying unit at "A" is fluidized, passes over heat exchange surfaces and is fed automatically into the cooling chamber. Again fluidized, it is cooled to the desired temperature. Leaving the cooler at "B", it is fed to next operation at a uniform rate. Fines from drying and cooling stages are captured by dust collectors. There is no product loss.



Major break-through in drying and cooling techniques announced by

GENERAL AMERICAN

A new system for drying and cooling has been perfected by General American Transportation Corporation through their development of Louisville Fluidized Bed* equipment. Two Louisville units, one functioning as a dryer and one as a cooler are coupled vertically to provide a continuous automatic operation.

The system is particularly useful for crystalline chemicals, resins, polyvinyl acetate beads, polyethylene pellets, sugar and similar products having the proper particle size distribution.

Louisville Fluidized Bed equipment offers these advantages:

1. Accurate, instantaneous temperature control
2. High heat transfer that permits compact design
3. Low maintenance costs (no moving parts)
4. Less cleaning time and labor
5. Less floor space (equipment is vertical)
6. No hot spots (product is fully protected)

Because of their simplicity, Louisville Fluidized Bed dryers and coolers adapt readily to complete automation.

For full details about this revolutionary development in drying techniques, write Dept. A.

Process Equipment Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

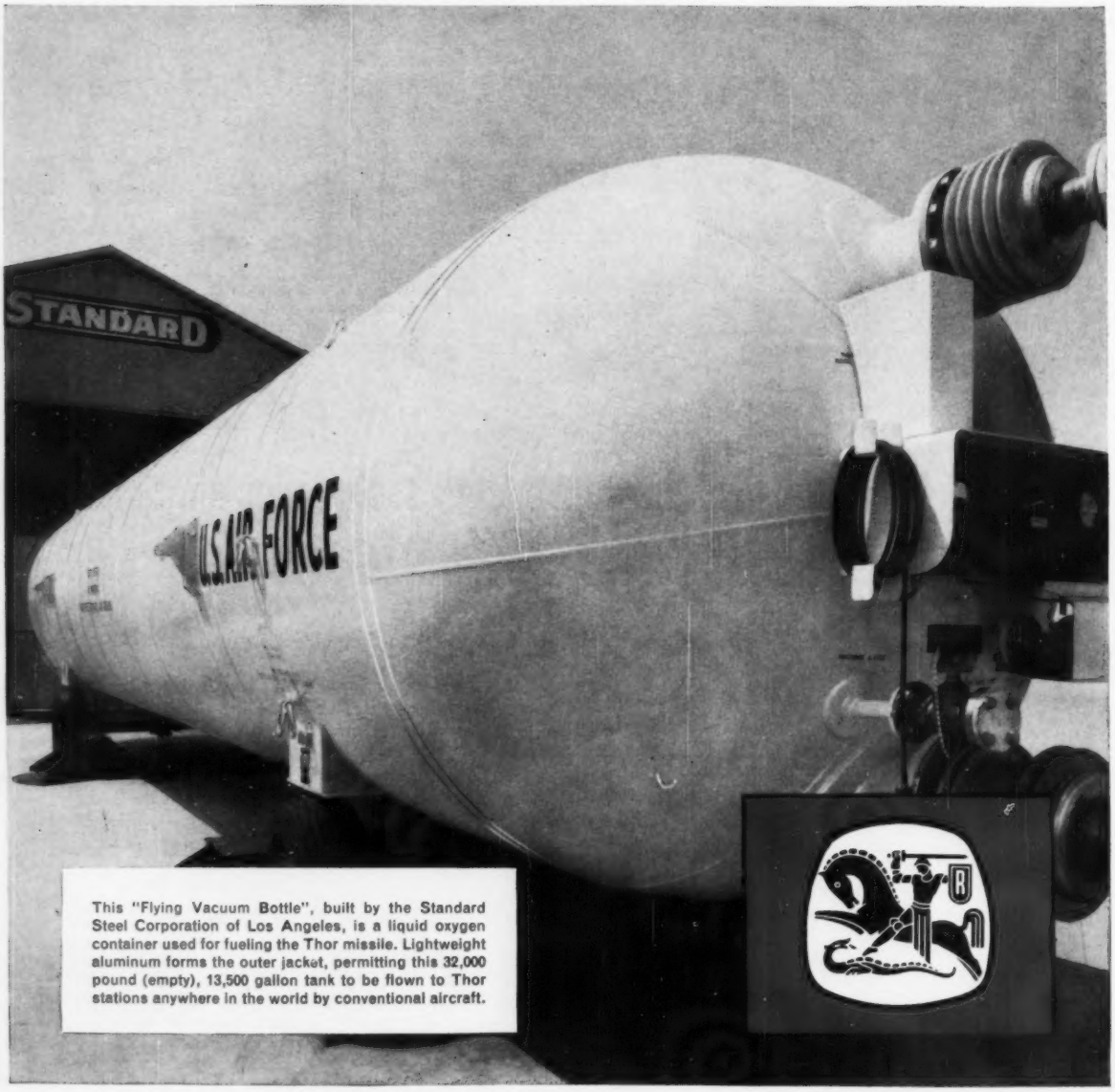
135 South LaSalle Street
Chicago 3, Illinois
Offices in principal cities

PROCESS EQUIPMENT DIVISION GENERAL AMERICAN TRADE MARK

*Patents Pending

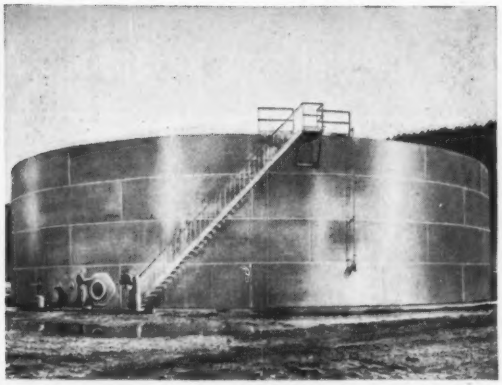
Aluminum Tanks and Vessels cost far less

...than those made with other corrosion-resistant metals!

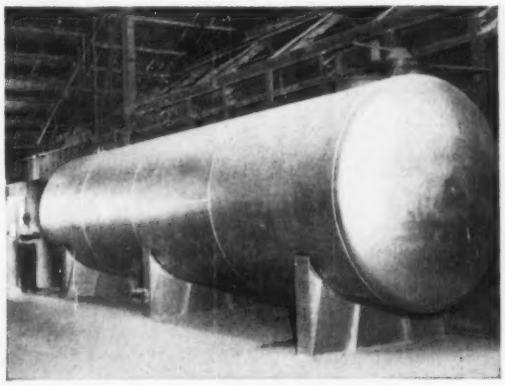


This "Flying Vacuum Bottle", built by the Standard Steel Corporation of Los Angeles, is a liquid oxygen container used for fueling the Thor missile. Lightweight aluminum forms the outer jacket, permitting this 32,000 pound (empty), 13,500 gallon tank to be flown to Thor stations anywhere in the world by conventional aircraft.

The major costs of tanks or vessels are for initial materials and subsequent maintenance—and aluminum is the one corrosion-resistant alloy that offers big savings in both. It is corrosion-resistant in most atmospheres and, it's easy to keep clean. Yes, aluminum costs less, far less, and here are more reasons why:



This giant aluminum tank holds ammonium nitrate solution. Non-sparking aluminum gives extra-long service under constant exposure to corrosion, with a minimum of maintenance.



Highly corrosive nitrogen solutions are safely stored in this tank made of Reynolds Aluminum for quick, local service to farmers for use in soil treatment.

CORROSION-RESISTANT

Aluminum resists corrosion from most process liquids. *Hydrogen peroxide, petroleum products, acetic acids, nitric acids, nitrogen solutions, turpentines, lacquers, beverages, sulphur-bearing gases*—all, and many other corrosives, can be handled in aluminum tanks and vessels without contamination or corrosion. Climatic conditions and atmospheric gases normally do not affect aluminum. Flammables may be safely stored in aluminum tanks and vessels, for aluminum is non-sparking.

LIGHTWEIGHT

Aluminum weighs just one third as much as steel. This can often mean lower fabricating costs. And it can result in other important cost reductions, from the initial purchase through handling, shipping and fabrication, to final installation.

EASY TO FABRICATE

Tanks and vessels require high quality welding . . . and aluminum is an exceptionally easy-to-weld material. In fact, welds of comparable strengths can be made five to eight times faster on aluminum than on most other metals! Brazing equally well, it is also one of the most formable, most economical metals to work with.

EXCELLENT THERMAL CHARACTERISTICS

Reflecting up to 95% of radiant heat, aluminum provides superior protection for volatile chemicals. And aluminum's high thermal conductivity speeds the transfer of heat.

LOW TEMPERATURE PROPERTIES

Aluminum, due to its excellent mechanical properties and low cost, is the ideal material for handling low temperature liquids such as *liquefied oxygen, nitrogen, methane,* etc.

IN USE EVERYWHERE

Aluminum is finding wider and wider use in the processing industry because no other metal offers so many benefits at such large savings. To learn how Reynolds Aluminum can help you, or for technical service, call your local Reynolds office or write *Reynolds Metals Company, Box 2346-CM, Richmond 18, Virginia.*

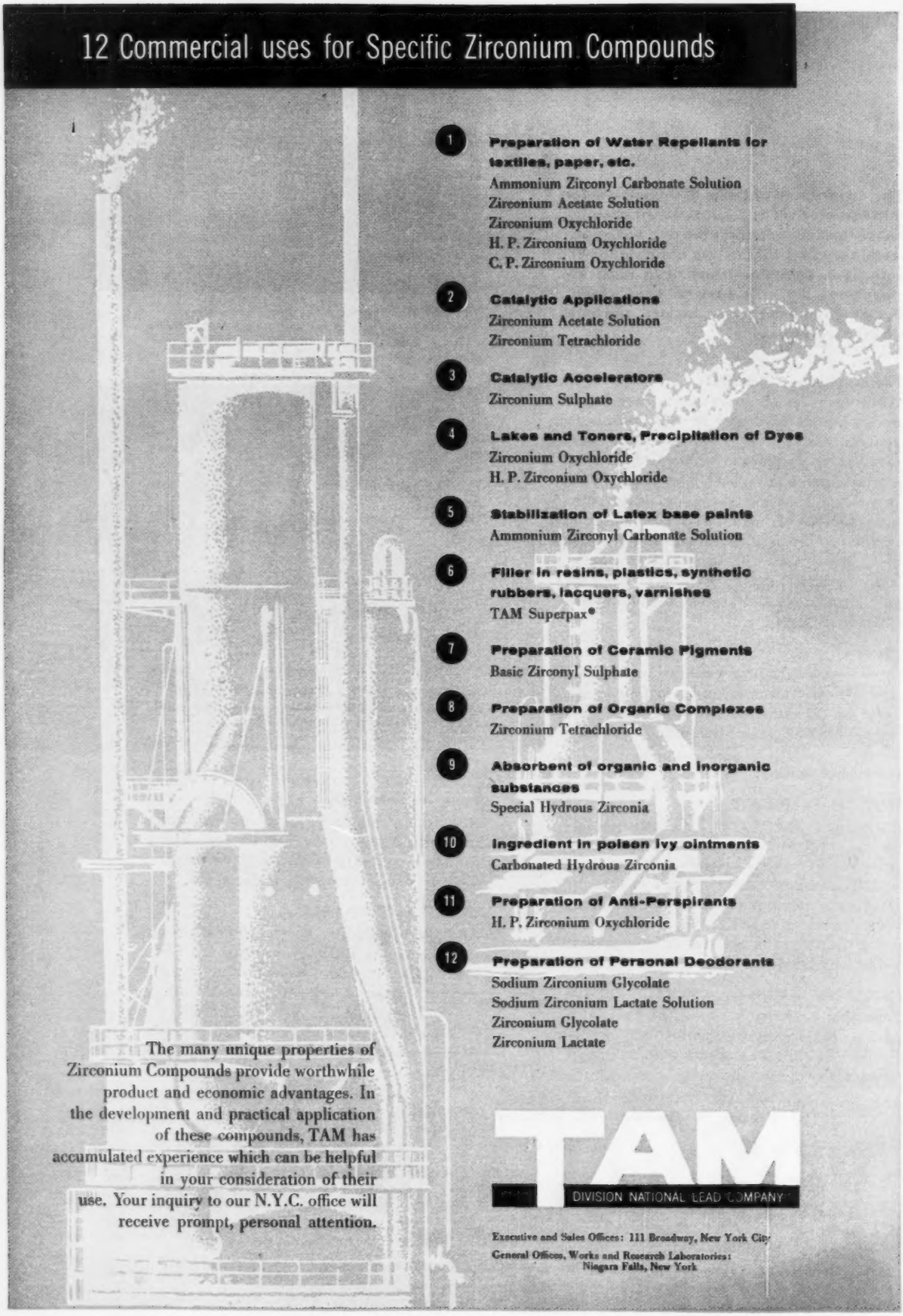
Write today for Reynolds Free Brochure on Aluminum Tanks and Vessels

REYNOLDS ALUMINUM

RICHMOND 18, VIRGINIA

Watch Reynolds new TV shows: "ADVENTURES IN PARADISE," "BOURBON STREET BEAT" and "ALL STAR GOLF"—ABC-TV

12 Commercial uses for Specific Zirconium Compounds



1. **Preparation of Water Repellants for textiles, paper, etc.**
   Ammonium Zirconyl Carbonate Solution
   Zirconium Acetate Solution
   Zirconium Oxychloride
   H. P. Zirconium Oxychloride
   C. P. Zirconium Oxychloride

2. **Catalytic Applications**
   Zirconium Acetate Solution
   Zirconium Tetrachloride

3. **Catalytic Accelerators**
   Zirconium Sulphate

4. **Lakes and Toners, Precipitation of Dyes**
   Zirconium Oxychloride
   H. P. Zirconium Oxychloride

5. **Stabilization of Latex base paints**
   Ammonium Zirconyl Carbonate Solution

6. **Filler in resins, plastics, synthetic rubbers, lacquers, varnishes**
   TAM Superpax®

7. **Preparation of Ceramic Pigments**
   Basic Zirconyl Sulphate

8. **Preparation of Organic Complexes**
   Zirconium Tetrachloride

9. **Absorbent of organic and inorganic substances**
   Special Hydrous Zirconia

10. **Ingredient in poison ivy ointments**
    Carbonated Hydrous Zirconia

11. **Preparation of Anti-Perspirants**
    H. P. Zirconium Oxychloride

12. **Preparation of Personal Deodorants**
    Sodium Zirconium Glycolate
    Sodium Zirconium Lactate Solution
    Zirconium Glycolate
    Zirconium Lactate

The many unique properties of Zirconium Compounds provide worthwhile product and economic advantages. In the development and practical application of these compounds, TAM has accumulated experience which can be helpful in your consideration of their use. Your inquiry to our N.Y.C. office will receive prompt, personal attention.

TAM

DIVISION NATIONAL LEAD COMPANY

Executive and Sales Offices: 111 Broadway, New York City
General Offices, Works and Research Laboratories:
Niagara Falls, New York

Washington
Newsletter

CHEMICAL WEEK
May 14, 1960

Tighter control over advertising of drugs is emerging as one of the primary objectives of the Kefauver investigating committee. Pfizer's advertising of its antidiabetic drug Diabinese as "free from significant incidence of adverse side effects" was brought under sharp attack last week. Kefauver drew testimony from physicians that while the drug is valuable and widely used, there are side effects the physician should know about. A diabetes specialist scored "pressure advertising" and acknowledged that most physicians do not have time to investigate drugs for themselves and should be warned of any side effects.

The Federal Trade Commission admits that it pays little attention to ethical-drug advertising to physicians, on the grounds that doctors can't be misled. Some of the antitrust remedies the Kefauver committee would like to see emerge, such as regulations on patent agreements, would be extremely difficult to formulate or put through Congress; but increased control over advertising could be easily accomplished, may be seized upon as a first, quick step.

•

The program aimed at shrinking the government's stockpile of natural rubber has been approved by Congress—General Services Administration has just revealed it plans to sell about 60,000 long tons before the fiscal year ends June 30.

Total disposal approved over a 9-year period will cover 470,000 l.t. Assuming natural rubber prices remain at present levels, this will bring Treasury more than $300 million. Actual volume of annual sales will vary with market conditions.

•

A huge new flow of Canadian natural gas to the West Coast is anticipated by '61. The plans of three U.S. companies to import some 584.5 million cu. ft./day into California and the Northwest have been approved by a Federal Power Commission examiner. Approval by the full commission is expected, since there was no opposition to the project during the proceedings.

The gas will go mostly to residential consumers but it's expected that, initially, considerable quantities will be made available, on an interruptible basis, for industrial and commercial use (*see CW Report, p. 63, and CW Business Newsletter, p. 36*).

•

Industry must now use a priority rating symbol on all orders sent out to fulfill a defense contract of its own. That's the result of a new ruling from the Commerce Dept.'s Business & Defense Services Administration. The new rule applies to orders for materials and components to fill contracts for military, space and atomic projects.

Previously contractors have been required to use a rating sym-

bol only on orders for controlled materials—that is, copper, steel, aluminum, and nickel alloys. Now suppliers must place the proper symbol on their orders even if, for instance, they involve a plastic, lumber or textile item.

The Administration's fight with the Democrats in Congress is building up, but the final outcome won't be known until Election Day. Eisenhower has his dander up, implies he might even call a special session should Congress refuse to vote his program. (He also threatens vetoes on pet legislation of the Democratic majority.)

Democratic leaders are rising to the challenge. Within the last several days Congress has taken actions that fly in the face of White House wishes:

A depressed areas relief bill cleared Congress last week. It provides for federal grants to stimulate employment and new industry in areas of chronic unemployment. The President wants only a program aimed at providing technical aid and loans to cities and areas in need, is expected to veto the $251-million Democratic bill.

The foreign-aid program is under attack, as Congress seems intent on cutting it $1 billion. Eisenhower insists the $4.2-billion authorization he requested is necessary.

Medical aid for the aged is building into a major political issue. Eisenhower has bent to public pressure, offered a plan for U.S. and state contributions toward such health legislation. The Democrats are rallying behind a system that would become part of Social Security, paid for by an increase in payroll taxes.

Minimum wage is a bait for the labor vote this fall. The Democrats will be vetoed if they increase the rate from $1/hour to $1.25. Eisenhower won't approve more than $1.15.

•

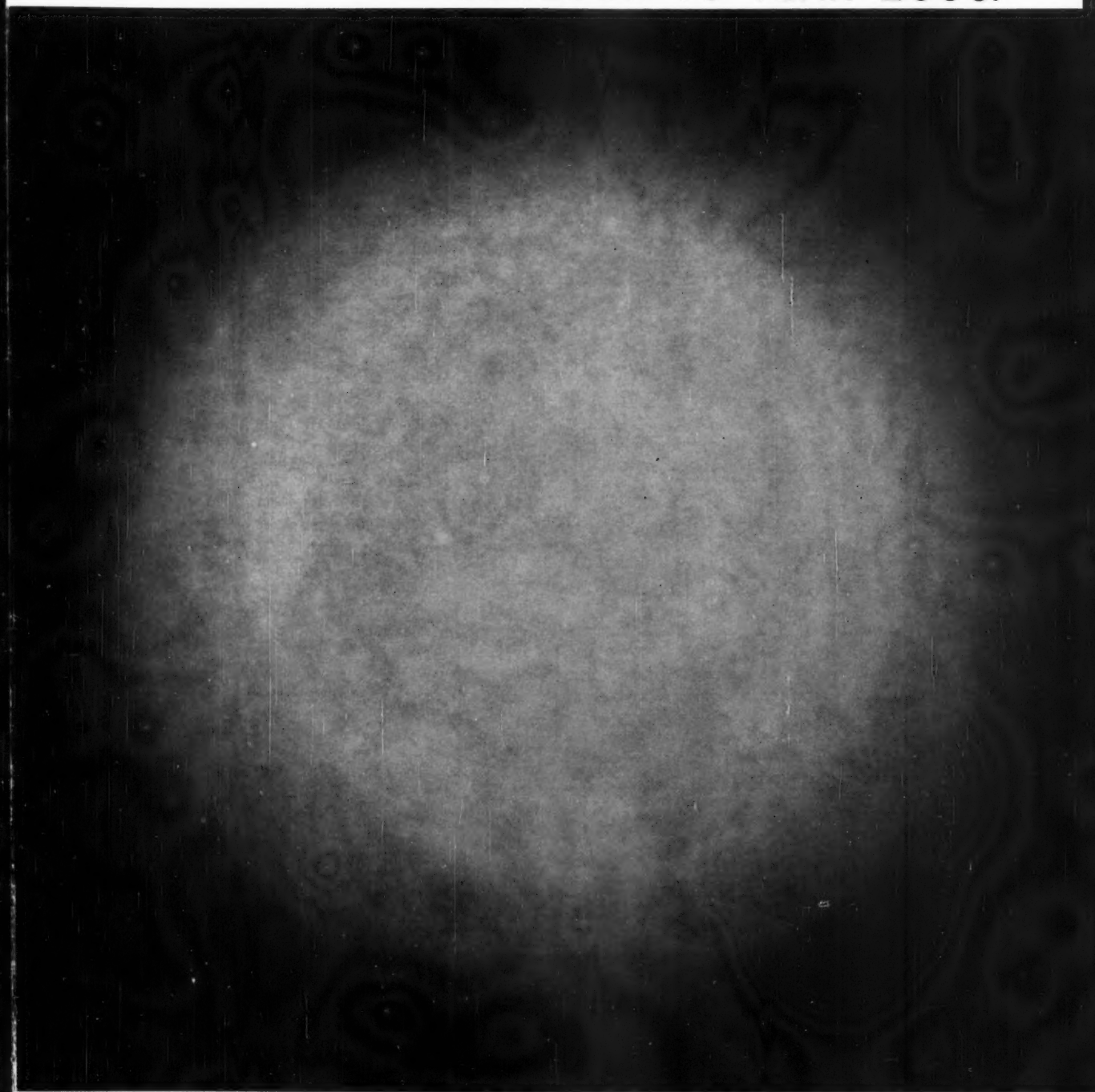
The House has passed and sent to the Senate a helium conservation bill, which calls for construction of up to 12 extraction plants to be located on natural gas lines.

Industry would participate in the program by building and operating the plants. The Dept. of Interior would enter into long-term contracts to buy the helium for government use and store the remainder in an underground, government-owned gas field near Amarillo, Tex.

The government estimates that this would save about 52 billion cu. ft. of helium that otherwise would be wasted. It's expected the program would pay for itself over a period of 25 years. Cost of plant construction is put at $255 million, to be borrowed from the Treasury. The latter would be paid back that amount, plus $245 million interest.

A price of $40/1,000 cu. ft.—a little more than double the present price—is believed sufficient to enable the program to pay out.

NEEDS ARE RISING AND SOURCES ARE SHIFTING— OUTLOOK TO YEAR 2000.



CHEMICAL WEEK REPORT

Energy Outlook—Quick Climb, Steady Shift in Sources

As the charts on the opposite page show, the U.S. is now on a gigantic energy-burning binge. In '58, 41.5 quadrillion Btu. were consumed. By '80, energy sources will be depleted at a 79.6-quadrillion-Btu. rate. And by 2000, demands will have climbed to 107.1 quadrillion Btu.

Such figures stagger the imagination. You can get a more meaningful idea from measuring energy consumption in terms of Qs; 1 Q is 10^{18} Btu. From 1800 through 1959, the country used up 1.411 Qs. Between '59 and '80, it will consume 1.285 Qs; and between '80 and 2000, 1.854 Qs. The 41-year total comes to 3.139 Qs or 2⅛ times the national energy consumption in the 159 years since 1800.

Shift in Sources: What it means is that all the currently used energy sources will be increasingly tapped. But in the next 15-20 years, at least, the burden of growth will be borne by oil and natural gas. Hydroelectric capacity will be steadily increased, but it will gradually lose some of its share of the total energy market. Coal will continue to hold its own. Sometime after '75, nuclear energy will make itself felt. After '80, petroleum sources will start to diminish in relative importance until the year 2000, when nuclear energy and coal will together supply more than half the energy consumed in the U.S.

Timetable Debate: The growth figures are based on the assumption of a 3% annual increase until '80, then a 1.5% annual growth until 2000. This is a critically weighted average of a group of recent authoritative estimates.

Examples: Resources for the Future, Inc., has predicted U.S. energy consumption of 75.3 quadrillion Btu. in '75. Nathaniel Guyol, economist for California Standard, foresees a demand for 84.8 quadrillion Btu. of energy in all of North America in '75. George Lamb, manager of business surveys for Consolidation Coal, expects a 68-quadrillion-Btu. consumption in '75, 78 quadrillion in '80. Phillip Sporn, president of American Electric Power Co., anticipates a 72-quadrillion-Btu. rate in '75, 104.8 quadrillion in 2000. Economists of the Chase Manhattan Bank see a 63.5-quadrillion-level in '67. Davis and Schweizer of Gulf Oil have projected a consumption of 57 quadrillion Btu. in '70.

There's general agreement, too, on the above-outlined shifts in energy sources. Largely because of the difficulty in projecting technological progress and the uncertainty of present data concerning energy reserves, precise dates in the timetable are subject to considerable error and some argument.

It's clear, however, that sometime before the end of the century, natural gas and oil are going to diminish in importance as energy sources. Today, there are considerable reserves of both. But the increasing consumption of energy is going to put an excessive drain on them.

Most estimates of the remaining "life" of energy resources are based on consumption at current rates. If, however, projected growth is taken into account, the picture is far different. Since it is virtually impossible to accurately forecast energy contributions from a single source, *CW* has divided the energy content of the reserves by the average annual consumption from all sources from '59 until 2000 (76.6×10^{15} Btu./year). The result (*p. 66*) demonstrates why coal will become more important after the next two decades.

The Chemical Stake: The chemical industry's extensive interest in the changing energy pattern is underscored by these statistics:

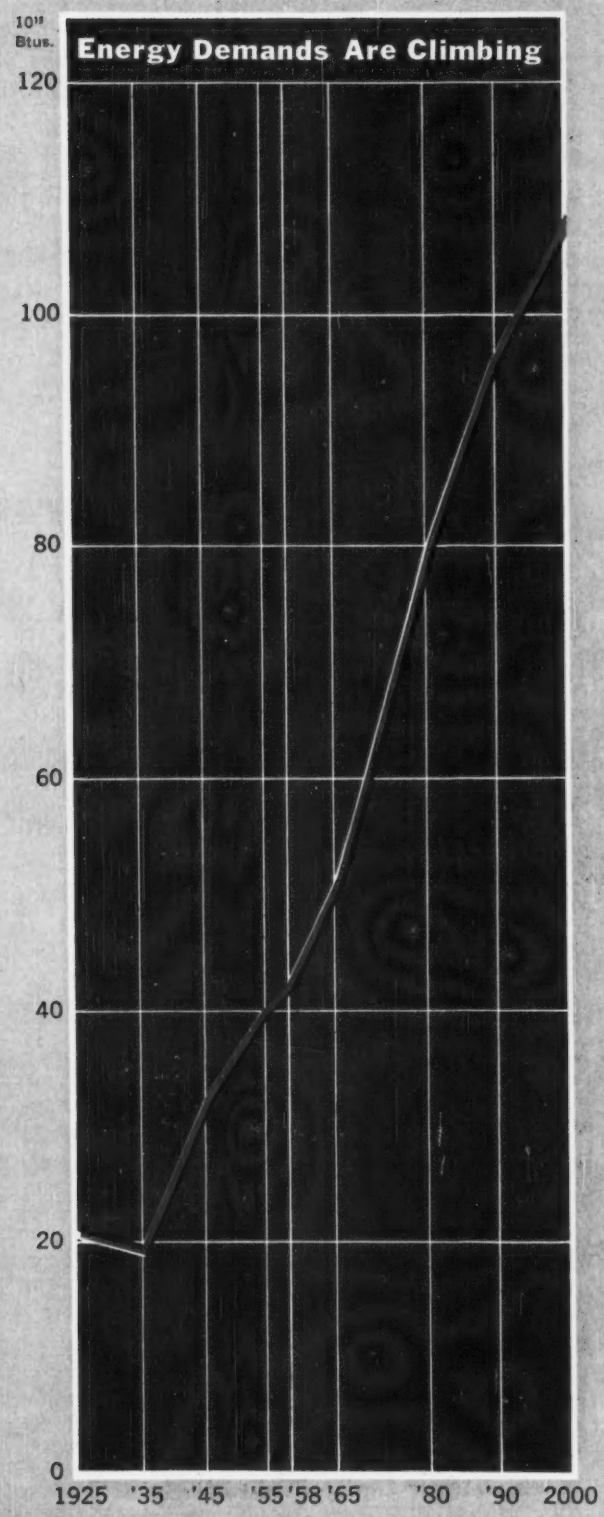
- In '57, the latest year for which Bureau of Census figures are available, industry in general picked up an energy bill (for heat and power only) of $3.9 billion (*see chart, p. 72*). The primary metals industry (including such heavy spenders for energy as aluminum producers) absorbed the lion's share—$1,179 million—of this tab. The chemicals and allied products industry was second: $409 million.
- Also in '57, the Bureau of Census reports that all industry purchased 259 billion kwh. of electricity. (This amounts to 46% of the national total of 558 billion kwh. sold that year as reported by *Electrical World*.) The chemical industry purchased 34% of all industrial power (*see chart, p. 90*). In addition, it generated 29% of the total 66 billion kwh. generated by industry for its own use. Although the electrical figures are inflated by the huge requirements of AEC's gaseous diffusion plants, it's clear that the process industries rank high on the customer prospect list of the electric utilities.
- The chemical process industries take 29% of all the natural gas sold in this country (*see chart, p. 68*).
- Not included in any of the above figures are the amounts of energy from different sources that end up as raw materials for chemical processing. For instance, 3.3% of the natural gas is used to make petrochemicals and carbon black. It has been estimated that 1-2% of the nation's refinery products end up as petrochemicals. In '58, the country's coke ovens (which took 16% of the bituminous coal mined) provided 669 million gal. of tar. The value of finished chemicals from coke ovens is estimated at approximately $270 million/year.

OIL—20 YEARS OF PLENTY

There's still plenty of oil left in the ground in the U.S. But it's getting progressively more difficult and expensive to find. Cheap foreign crudes, meanwhile, are serving to keep domestic prices down. Thus, the incentive for domestic drilling is diminishing, as is the incentive for developing a commercial-shale oil industry. Outlook: oil will be plentiful and inexpensive for at least 10-15 years.

In years past, it was customary to view the rising demand for oil and the "dwindling supplies" with alarm and to predict that the U.S. would have to switch back to coal or make increasing use of energy source. These predictions often specified that this would occur "within the decade."

The fact is that proved reserves of oil (and natural gas) are at an all-time high. The industry has consistently found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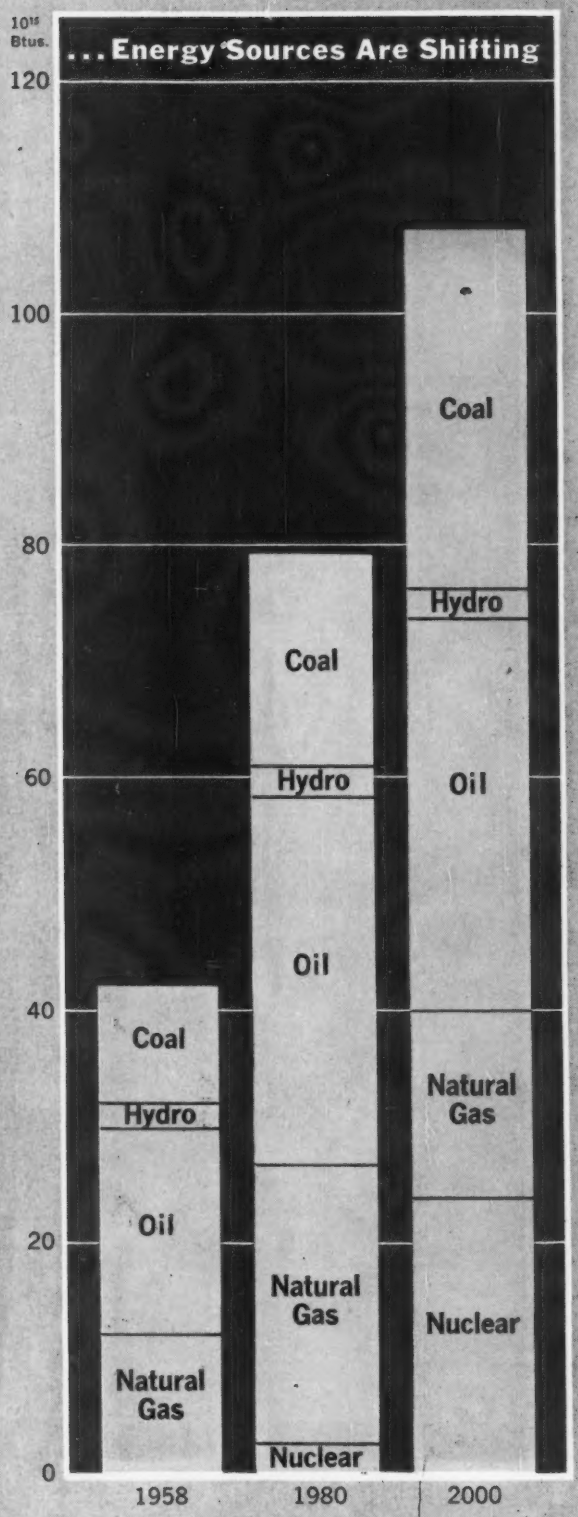
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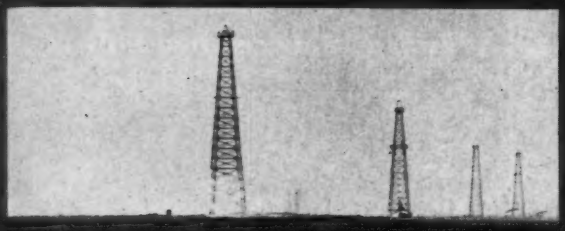
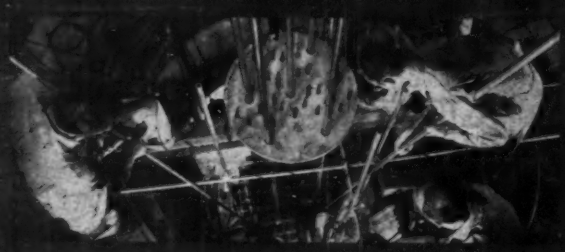
U.S. Energy Resources — What Remains to Be Found





	Estimated quantity still to be developed	Energy equivalent 10^{15} Btu.	No. of years' supply*
Oil	140-500 million bbls.	812-3850	11-50
Natural gas	700-1,700 trillion cu. ft.	735-1785	10-23
Coal, lignite, etc.	1.2 trillion tons	25,750	337
Shale oil	1.5 trillion bbls.	8,700	114
Nuclear	250,000 tons of U_3O_8	5,150	67
Hydropower	141 million kw.	2.4†	—

*Years' supply: Energy of reserve 75.5 × 10^{15} Btu. (avg. energy consumption from all sources — 1955-2000).

**Based on an advanced technology that would represent 30% utilization. At current utilization (1.2%), the figure would be 205 10^{15} Btu.

†Based on generation of 5,000 kwh. year per kilowatt of installed capacity, the average of present hydroelectric plants.

more oil than it has, so far, been able to produce.

The alarmists' cries stemmed in part from a misunderstanding of oil industry terms, in part from a consistent underestimation of the amount of oil remaining in the ground, and in part from a failure to foresee technological improvements that are now enabling oilmen to recover more and more oil from existing wells. They also failed to take into account the tremendous impact of oil imports as a source.

What's In a Name: To understand the terminology problem, you must understand the industry's use of the terms "proved reserves," "life index" and "ultimate reserves."

Proved reserves is simply the amount of oil known—by current data—to exist in the ground and that can be recovered by existing technology. Each year proved reserves are adjusted by subtracting production, adding new discoveries and revising estimates of known fields. As such it's a working inventory.

However, the petroleum industry has customarily divided the proved reserves by the current rate of production to arrive at a "life index." This, when it dropped to 12, fostered the erroneous impression that there was only 12 years' supply of oil in the ground. Actually, life index is an esoteric term. A certain minimum life index may be necessary for sound financial planning, but it's a poor indicator of the amount of oil remaining.

A better barometer is the "ultimate reserve." This is the amount of oil that has been produced in the past, plus all the oil that can be recovered in the future. Unfortunately there is no way of knowing for sure how much oil remains to be discovered. Consequently the ultimate reserve figures are at best educated guesses.

Certainly, though, the ultimate reserve is considerably larger than it was thought to be even 8-10 years ago. Ayres and Scarlott, in their classic book on energy sources,* published in '52, cite 120 billion bbls. as a highly optimistic, outside figure for ultimate reserves.

Recent estimates peg it at 200-300 billion bbls. Subtracting past production (60 billion bbls.) leaves 140-240 billion bbls. remaining to be recovered—by existing technology.

And Bruce Netschert, senior research associate for Resources for the Future, holds out the intriguing possibility of recovering many times that figure. He reasons this way: in the past, the industry has been able to recover only one-third of the oil found in the ground; but improving techniques are permitting higher recoveries—close to 100% in pilot tests.

He argues that past production has left 120 billion bbls. of oil in the ground. Also, present reserves (33.5 billion bbls. as of Jan. 1, '60) should be multiplied by three. It comes to 220 billion bbls. of known oil economically unrecoverable by present methods.

He applies the same logic to estimates of oil yet undiscovered in the ultimate reserve estimates. In this way it's possible to arrive at figures for the total oil in the U.S. remaning to be found—ranging from 420 billion to 720 billion bbls. Addition of the 220 billion bbls. known to exist but currently unrecoverable yields a potential of 640-940 billion bbls.

Netschert, however, feels that 500 billion bbls. is a better average. Even this, he points out, is not a measure of the amount of oil that will actually be produced in the future. Rather, it's a yardstick against which future technological improvements can be measured.

Estimates vs. Use: Such estimates of reserves, of course, take on meaning only when compared with estimated future demands. Here's how Richard Gonzales, treasurer for Humble Oil, sees it: demand for petroleum products in this country is growing at a rate of 3% a year. However, imports of crude and competition from natural gas will probably slow this to 2.5%. It translates to a need of 30 billion bbls. of production in the '60s, 37 billion bbls. in the '70s, provided the current ratio of domestic/foreign crude doesn't change. To do that, while maintaining a reasonable relation of reserves to production, domestic producers would have to add 80 billion bbls.

Assuming even the most pessimistic views of oil reserves, the industry should have no trouble meeting this goal. Gonzales points out that gross additions in the '50s came to 30 billion bbls. A continuation of the same rate means that the oil industry should add 60 billion bbls. during the next 20 years. That's three-fourths of the requirements he expects. His conclusion: a moderate increase in effort, when demand warrants, should enable the industry to find the remaining one-quarter.

However, oil people are quick to point out that it's getting harder and more expensive to find oil. Most of the big oil deposits close to the surface have already been located. Explorers are now making smaller finds and digging deeper to get them. And drilling costs go up geometrically with the depth of the hole. That's because deeper drilling involves higher pressures, heavier equipment. Moreover, in a deep well, less time is spent in actual rock cutting because of the increased time spent in pulling drill pipe to change bits.

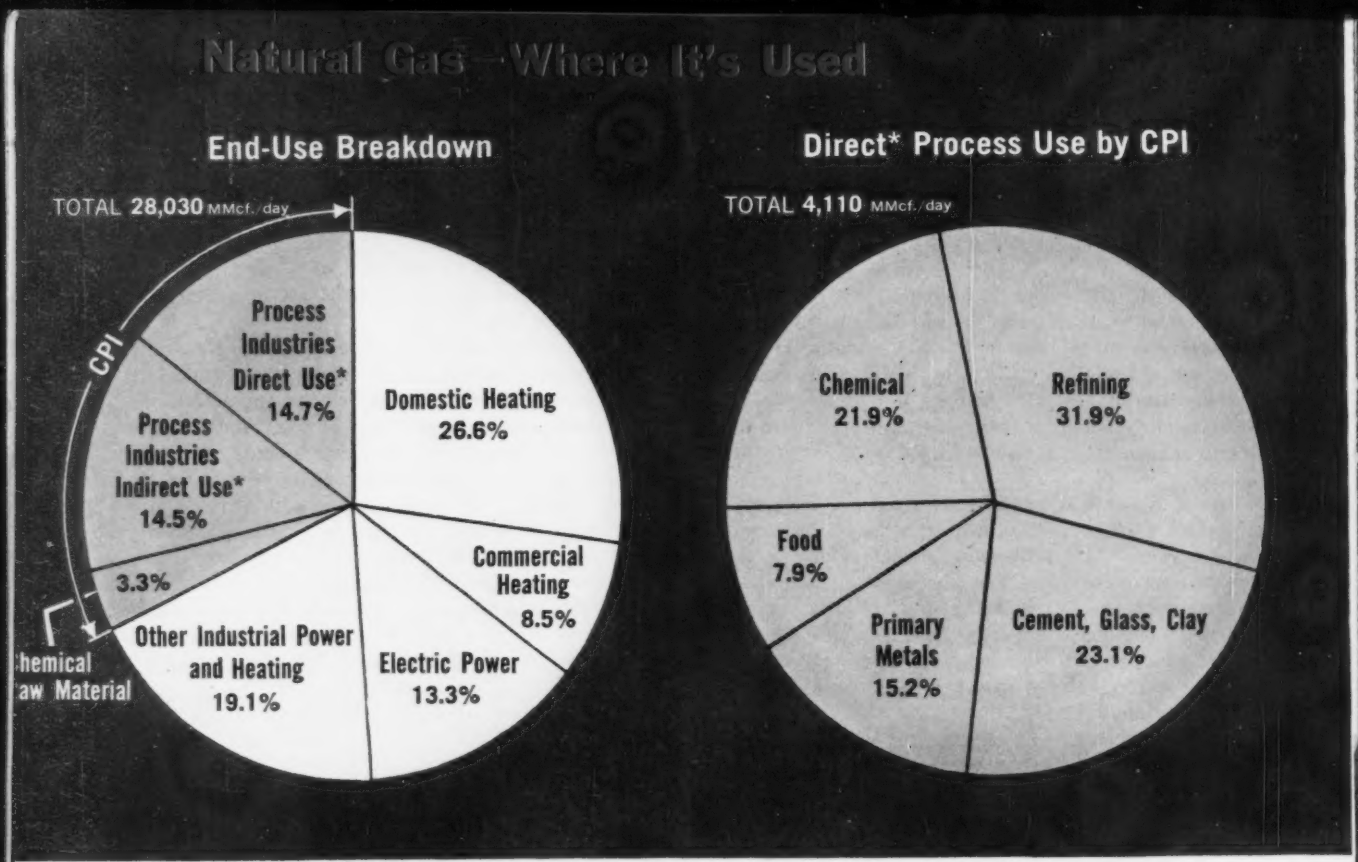
Since drilling for oil is a chancy business at best, oil men need a strong financial incentive for exploration. And that's where the touchy question of imports comes in. This is the background:

During the Suez crisis, there was a big buildup of oil production capacity and of ships to carry the oil. Moreover, petroleum in other areas of the world is much cheaper to find. A barrel of crude in the U.S. is now worth $2.93. Imported oil can be brought in reportedly for 80¢ to $1.20/bbl. less. And that includes heavy hauling costs, which can be half the total.

Companies with large overseas holdings naturally prefer to bring in this cheap oil. They can argue that it's a means of assuring the ultimate customer that he is getting his products at the lowest possible price. They also point out that importing is a conservation step. Others argue, just as strongly, that imports could ruin domestic production.

The present system is a compromise. The government

* "Energy Sources—The Wealth of the World," McGraw-Hill.



has established an import limit, which is revised every six months, presumably to keep the domestic prices from rising. Quotas are based on a percentage of refinery input (the bigger the refiner, the smaller the percentage) as well as allocations under a previous Voluntary Oil Imports Program. For the current period, quotas total 1,530 million bbls./day, or 16% of the average '59 demand of 9,432 million bbls./day.

What Price Shale? While imports are providing a ceiling for domestic crude prices, they're also braking development of the domestic oil-shale industry.

It's hard to assess oil shale reserves. Data is far from complete. And the amount of oil that can be recovered from shale varies considerably (from 10 to 60 gal. or more per ton). Since there is now no commercial shale-oil production in the U.S., it's difficult to say what the minimum content would be for "economic recovery."

One thing is sure, however: there is plenty of oil shale. Ayres and Scarlott estimated potential oil recovery at 365 billion bbls. Since then, estimates have increased at least fourfold. Cameron and Jones, consulting firm, now estimates the country could eventually recover 2 trillion bbls. of oil from its shale deposits.

Moreover, the technology for doing this is now ready, due largely to efforts of Bureau of Mines and Union Oil.

In its study of oil-shale economics in '51 (*CW, Nov. 17, '51, p. 16*), the National Petroleum Council showed that gasoline made from shale oil could be sold in California for 14.7¢/gal. Since these prices were just a few cents above the going market price for gasoline from conventional crude, it was easy to arrive at the conclusion that oil shale would become competitive within a few years.

Time, however, has not dealt kindly with the economics of oil shale. Rising costs of equipment and engineering mean that to arrive at a reasonable price for gasoline, today, the NPC figures would have to be boosted 30%. Meanwhile imported crudes have kept the price of gasoline from conventional sources from rising anywhere near 30%. In addition, the NPC figures were based on a 6% return after taxes. At a 12% return, probably a more reasonable figure, prices of gasoline from shale would be almost twice those of gasoline from crude.

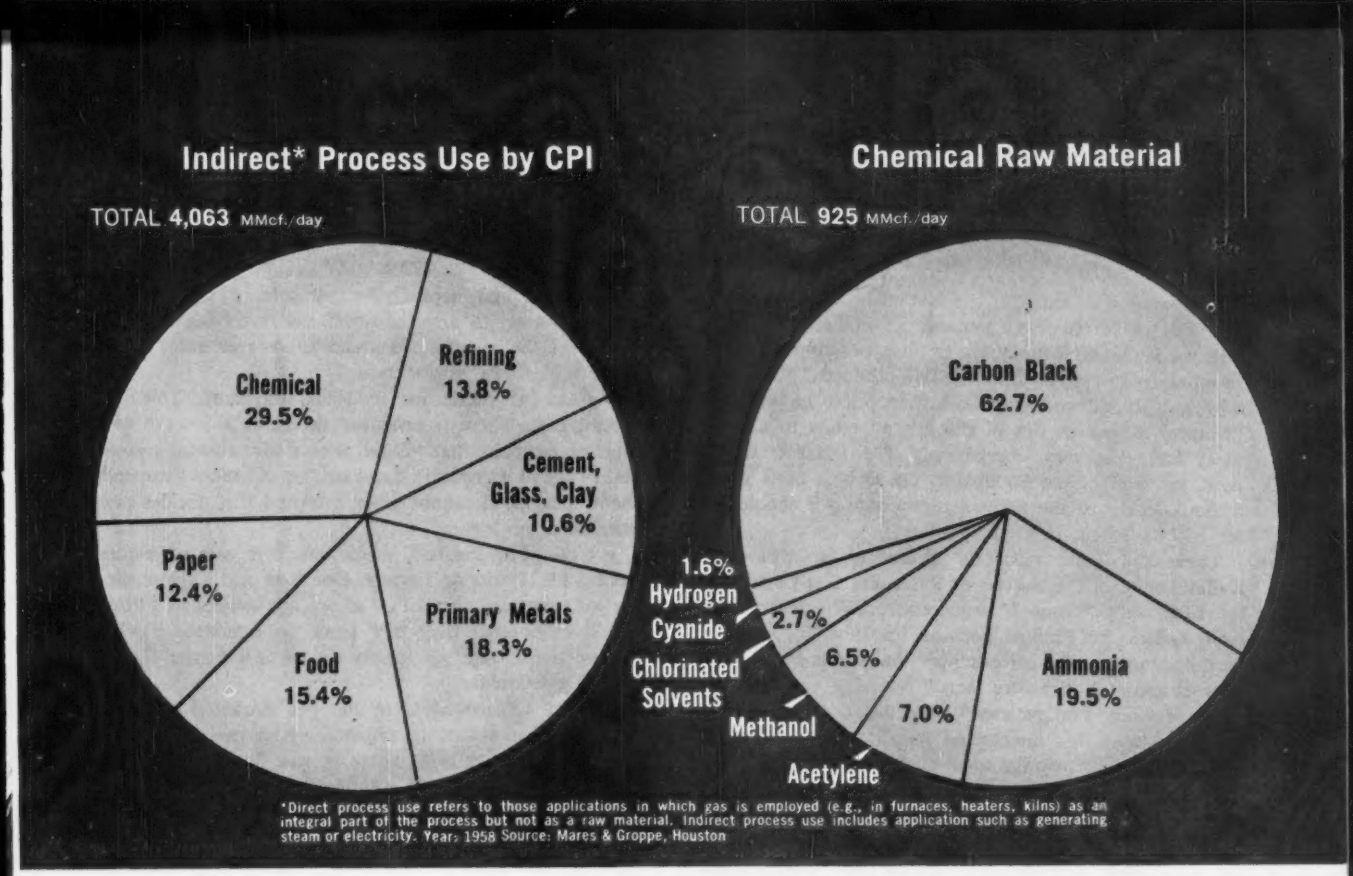
Indications are that the current surplus of oil will last many years. Barring unforeseen change in the government's attitude or a breakthrough in oil-shale technology, it's not likely that an oil-shale industry will be established in the foreseeable future.

NATURAL GAS—RISING DEMAND, PRICES

There's also plenty of natural gas in the ground—and there's a market waiting for it. Producers feel that gas should assume a larger share of the drilling costs, are chafing under FPC regulations controlling the price they can charge for the gas. Moreover they know that if prices go too high, gas could price itself out of the market. Probably no other area of the energy picture is so confusing. None certainly is as important to the chemical process industries.

In '48, the life index for natural gas was approximately 29. Despite a 45% increase in proved reserves in 10 years (from 174 trillion cu.ft. in '48 to 254 trillion in '58), the life index has dropped to slightly more than 20. There are some valid theoretical reasons why this could go as low as 10 or even 5 without danger of total depletion.

In practice, however, underwriters require a minimum of 20 years' supply before they approve a pipeline financing program. And FPC usually requires such a supply before it permits construction of a major pipeline.



Producers should have no difficulty maintaining that. Potential reserves are at least five times the proved reserves. Because it is possible to draw a historical relationship between the ratio of gas discoveries to oil discoveries, reserves of gas can be tied closely to the reserves of oil. In the past, this ratio has varied between 5,000 and 7,000 cu.ft./barrel of oil.

In any case, 1,200 trillion cu.ft. would seem to be a reasonable average of several recent estimates of the amount of gas waiting to be found. Moreover, because deeper drilling tends to uncover more gas than oil, chances are that these are conservative estimates.

It boils down to a question of incentives. Because of the petroleum surplus, producers contend, there is little incentive to drill for oil. Therefore, they feel, gas should shoulder a bigger portion of the drilling costs.

P. H. Bohart, administrative vice-president and coordinator of Gulf Oil's Crude Oil Dept., outlined the case* this way: he statistically correlated the amount of drilling with the price of crude, then pointed out that it's impossible to distinguish between drilling for oil and drilling for natural gas. Anticipating an annual increase of 5%/year in gas demand, he concluded that in '67 the industry will have to sink 80,000 wells, 31,000 more than were drilled in '58. He took a dim view of the possibilities that producers would dig that many wells just for oil, and concluded that the only way the goal could be reached would be to allow higher prices for natural gas.

There's no question that oilmen are banking heavier on gas than on oil, at least for short-term growth. Michel Halbouty, consulting geologist and petroleum engineer, as well as a big independent oil and gas producer (in the "300-400 megabuck" class, according to *Business Week*), tells CHEMICAL WEEK: "Because of the increasing value of natural gas, in space heating, industrial fuels and especially in the process industries, I've been emphasizing gas in my exploration activities." What he means is that, although it is impossible to drill for oil alone or for gas alone, it is possible to select certain depths and areas where the probability of finding gas is better than that of finding oil.

Question of Controls: The present price of natural gas, in fact, bears little relationship to its value. "It is an insane situation," says a prominent engineer of a large engineering-construction firm, "they're selling 'Cadillacs' at 'Chevrolet' prices." This has all come about because the popularity of natural gas is a recent phenomenon.*

In the early days of the oil industry, producers were discouraged when they hit gas instead of oil. But the development of suitable piping and the inherent advantages of gas have made it the fuel of choice for home heating and important industrial applications. Today the gas industry, the fifth largest in the country, has $21.5 billion in gross assets. The U.S. pipeline network for natural gas totals 571,500 miles, and it is still growing fast. The American Gas Assn. has predicted a 911,500 mile network by '75.

But gas prices have never caught up with those of other fuels, at least in the Southwest where the bulk of it comes from. Producers contend that the FPC has been artificially depressing the price. In this, they get strong vocal support from the coal interests, who would like to see gas prices go up.

"Just look at it from a Btu. standpoint," says Glen

* In FPC hearings; docket No. G-9520, et al.

* Natural gas has been recovered for thousands of years. Before 3000 B.C., flares of natural gas, probably fired by lightning, were points of worship in ancient temples. These flares were illustrated on ancient coins. Earlier than 1000 B.C., the Chinese were drilling gas wells, reportedly as deep as 3,000 ft., and transporting gas through bamboo pipelines. In this country, George Washington is said to have commented on a "burning spring" in West Virginia.

. . . the drive in gas is for intrastate sales

Parker, staff economist for the National Coal Policy Conference. "A barrel of oil contains 5.8 million Btu. and it sells for $2.93. And they have to invest millions of dollars in refineries to convert it into usable products." Explaining why gas should command a higher price, he goes on: "Natural gas comes out of the ground ready to use, the ideal fuel. Yet they charge only 12¢/1,000 cu.ft. for it at the well in the Southwest. On a Btu. basis alone, without regard to the necessary processing, it should sell for 65-70¢/M cu. ft."

These and other types of arguments are what Carl Kallina, chief of the Bureau of Rates and Gas Certificates for FPC, calls " 'June 8' arguments. . . . We never heard them before the Phillips decision on June 7, '54. Yet, they had ample time to establish the proper price ratio between gas and oil before then."

The famous Phillips case* was the decision by the Supreme Court that interpreted the Natural Gas Act of '38 as giving FPC power to regulate well-head prices of natural gas sold in interstate commerce. Repurcussions are still being felt.

In fact, within weeks of six years after the decision, the commission has still not figured out what Phillips' rates should be. Only last month, Phillips offered to settle. Essence of its suggestion: if the commission will ratify its current rates (which are bringing in $70.8 million annually), Phillips will not contest any cost-price formula FPC arrives at.

The ultimate decision in the Phillips case is expected to set a lot of precedents. But that's still distant, since it's not likely that FPC will accept Phillips' offer—at least without modification. Further, there is no assurance that the rest of the industry will go along with the Phillips proposal. And finally, although disposal of the Phillips case will go a long way toward clearing the atmosphere, it's bound to leave a number of problems unsolved.

Lyman Darling of Du Pont's Engineering Dept. sums up the situation as well as anyone. "There is," he says, "a lot of law-ing going on down there."

FPC and Industrial Sales: It's frequently pointed out that the FPC has no jurisdiction over industrial sales. That, however, is an oversimplification. FPC indeed does have authority concerning industrial sales, and an understanding of it is needed to understand the importance of the Phillips case and others.

- Intrastate sales. FPC has no jurisdiction over intrastate sales. It can only regulate interstate "sales for resale." However, if gas is "co-mingled" in a pipeline so that it is impossible to separate interstate from intrastate gas, the entire system is subject to FPC jurisdiction. Thus, a customer sitting on top of a well could conceivably be buying "interstate" gas if he were the first customer off a pipeline that was carrying the rest of the gas to another state.

- Industrial sales. The FPC has no price jurisdiction over sales to industry. However, any time an interstate pipeline is built, the FPC must issue a certificate of "public convenience and necessity." Therefore, FPC must give prior approval to any industrial sale involving interstate gas. Once the certificate is granted, however, rates do not come under FPC jurisdiction.

- Sale for resale for industrial use only. This is a special case where a producer dedicates a reserve to a pipeline company that will sell it only to industrial customers. FPC can fix rates in that case, but it cannot "suspend" them. That is, it cannot order a refund if it decides rates have been too high.

- LPG. FPC has no jurisdiction over sale of natural gas liquids. Plants at Tuscola, Doe Run and Calvert City, for example, use only LPG, so are not subject to FPC at all. Even though they buy from an interstate pipeline system, the natural gas merely serves as a carrier for the natural gas liquids.

Indirect Effects: Most of the gas marketed (59% in '58) moves in interstate shipment. And despite the fact that industry takes a big share of gas, domestic and residential heating combined account for a big slice, too. And FPC policies on such a big share of the market are bound to be reflected to some degree in the remainder.

What's more, it's not impossible that FPC could eventually end up with regulatory power over industrial sales. It has been asking Congress for just such authority on the theory that it "makes more sense to control the whole package."

Intrastate Drive: But probably the most important aspect of the Phillips decision on chemical process industry customers has been its encouragement of sales within the producing state. And it has not killed interstate business—the percentage of marketed production that goes interstate is still growing.† Interstate sales, however, are not increasing as fast as they would have otherwise.

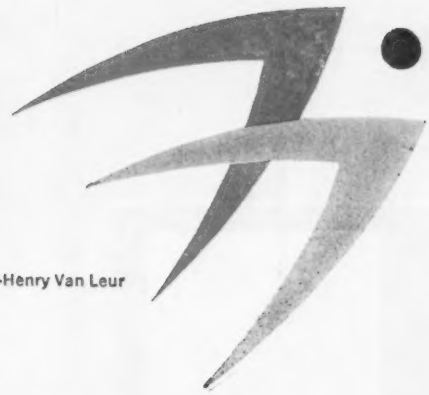
Part of the growth of intrastate sales has been because producers are actively seeking chemical processors and other industrial customers. They'll build pipelines to plants. Objective: year-round, steady customers—beyond the FPC pale.

The Phillips decision has caused a change in the pattern of buying, too. Historically, chemical companies have bought from pipeline companies. But the trend is toward buying directly from the producer. That way, they get gas at the field rate plus a charge for transportation. Since, on the Gulf Coast, few companies buy from a source more than 50 miles away, the transportation charge is modest.

However, the drive for intrastate sales has been a mixed blessing, because such contracts normally contain higher escalation clauses. For the most part, contracts cover extended periods (15-20 years) with escalations every five years. Producers try higher for high initial rate with comparatively low escalations on interstate sales. Their reasoning: the FPC might step in and disallow an escalation. On the other hand, the producer selling intrastate may

* In the State of Wisconsin vs. Phillips Petroleum Co., 347 U.S. 672.

† The Bureau of Mines in its preprint for the "1958 Minerals Yearbook" reports interstate shipments comprised 59% of marketed production in '58. This was an increase over the 57% for '57. These figures include exports of natural gas to Canada and Mexico, which accounted for most of the percentage increase.



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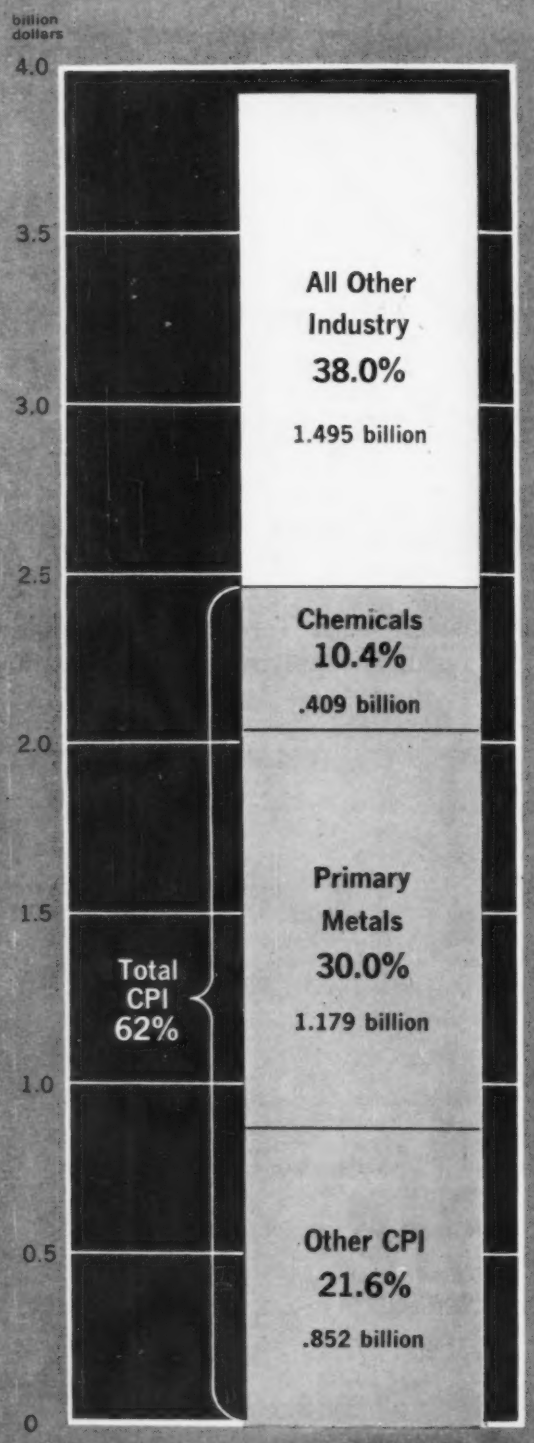


Source: Bureau of Census figures for 1957, latest year available. Includes fuels (natural gas, bituminous coal, etc.) purchased for power and heat. Includes neither cost of electricity purchased, nor cost of fuels purchased and consumed in same plant, nor cost of fuels used as raw materials.

settle for a lower initial rate but with a higher escalation.

Push on Prices: Regardless of whether gas is sold in or out of the state, prices are still climbing. The Bureau of Mines—one of a number of organizations publishing average national and state prices—estimates the average '58 wellhead price for gas in Texas at 10¢/1,000 cu. ft. But because of time lags in reporting and compilations and other factors, most published figures are a year or more behind trends.

CW's chart (*p. 84*) shows the actual average prices charged by Texas producers since '51. It shows the average price reached 14¢/1,000 cu. ft. early this year. It means that chemical process customers are paying 16-18¢ for their gas.

Another point to remember in assessing any average prices: Despite escalator clauses, gas on old contracts is selling well below the average. Some CPI customers are getting gas under old contracts for 9¢. A small amount from old fields is even being sold at 3¢. By contrast, a customer wanting a new supply of gas would have no trouble procuring all he wants. But he can expect to pay 20¢ or close to it.

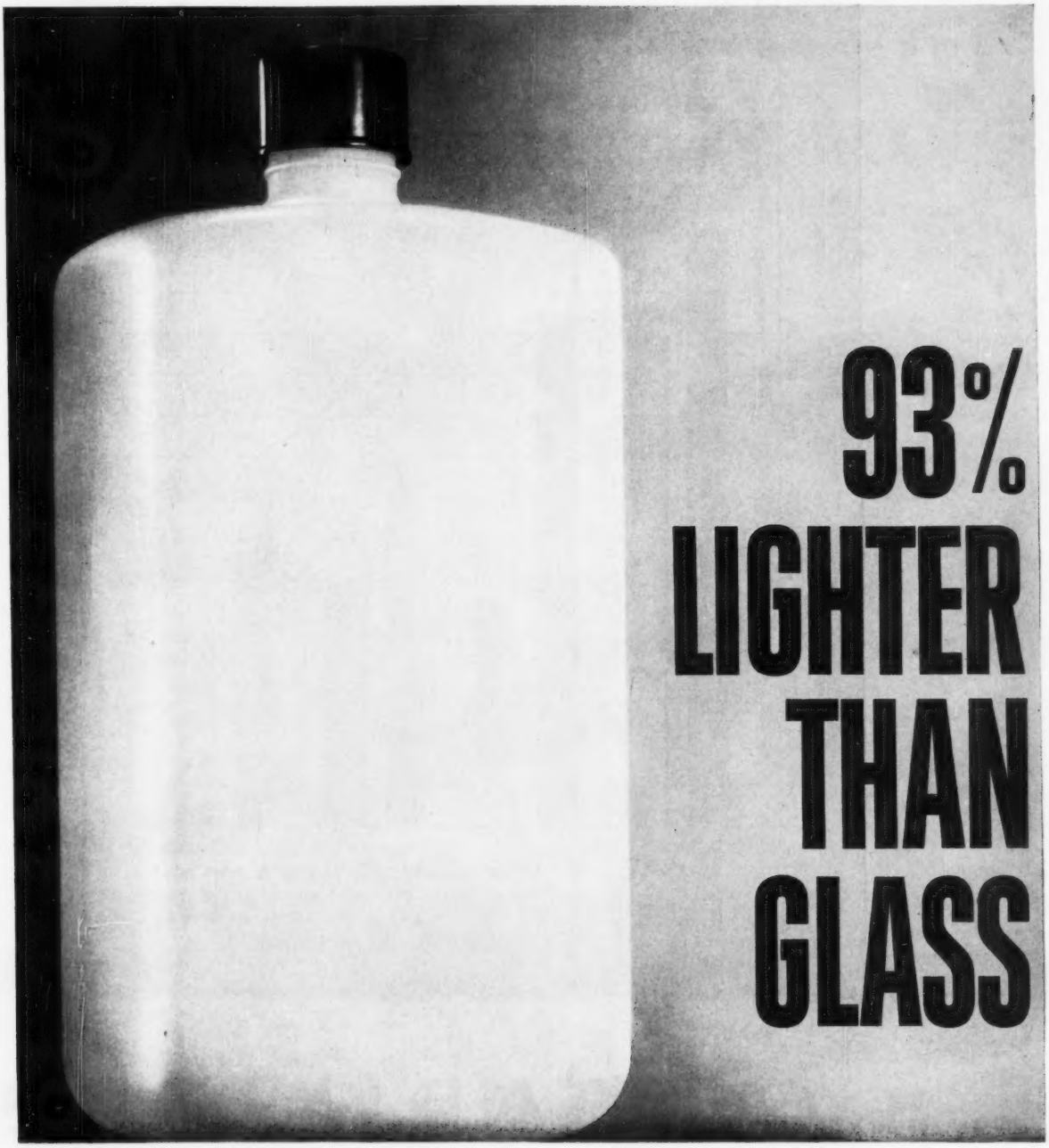
National averages are fairly meaningless because they are so heavily weighted by the six big producing states (Texas, Louisiana, Oklahoma, Arkansas, New Mexico and Kansas) which account for 85-90% of the national output. As a point of reference, however: Du Pont is believed to be paying 36¢/1,000 cu.ft. for natural gas at Belle, W. Va.

Leveling Off? It's obvious from the chart that wellhead prices have been going up at a constant rate of 1¢/1,000 cu. ft./year. However, most gas producers agree that this rate will fall to ¾¢/year.

Influencing their thinking no doubt is the fact that if gas goes too high, it will become more expensive to use than coal. The exact point at which it will be "cheaper to use coal" depends on a number of variables. In coal's favor are the fact that on a Btu. basis at the mine, it is already a good buy. The average mine price now of $4.86/ton is equivalent to natural gas at 18-19¢/1,000 cu. ft. And a large user willing to sign up on a long contract would have no trouble getting coal for half the national average. In addition, coal shows higher boiler efficiencies than natural gas. (The higher hydrogen-to-carbon ratio of natural gas causes more water vapor in the stack.)

But costs for moving coal are considerably higher than for gas. (Coal is customarily shipped by rail and costs average 1-3¢/ton-mile. Rule of thumb for gas: it costs 1½¢ to move 1,000 cu. ft. of gas 100 miles in big lines under 100% load). And coal requires a bigger investment in handling, pulverizing equipment; it involves larger-volume furnaces and a bigger labor force for operation and maintenance.

Taking these factors into account, Jack Burk (of Barnard and Burk, consultants) compared costs of using coal or gas in industrial plants in Baton Rouge. He based his work on large (500,000 tons/year or more) ship-



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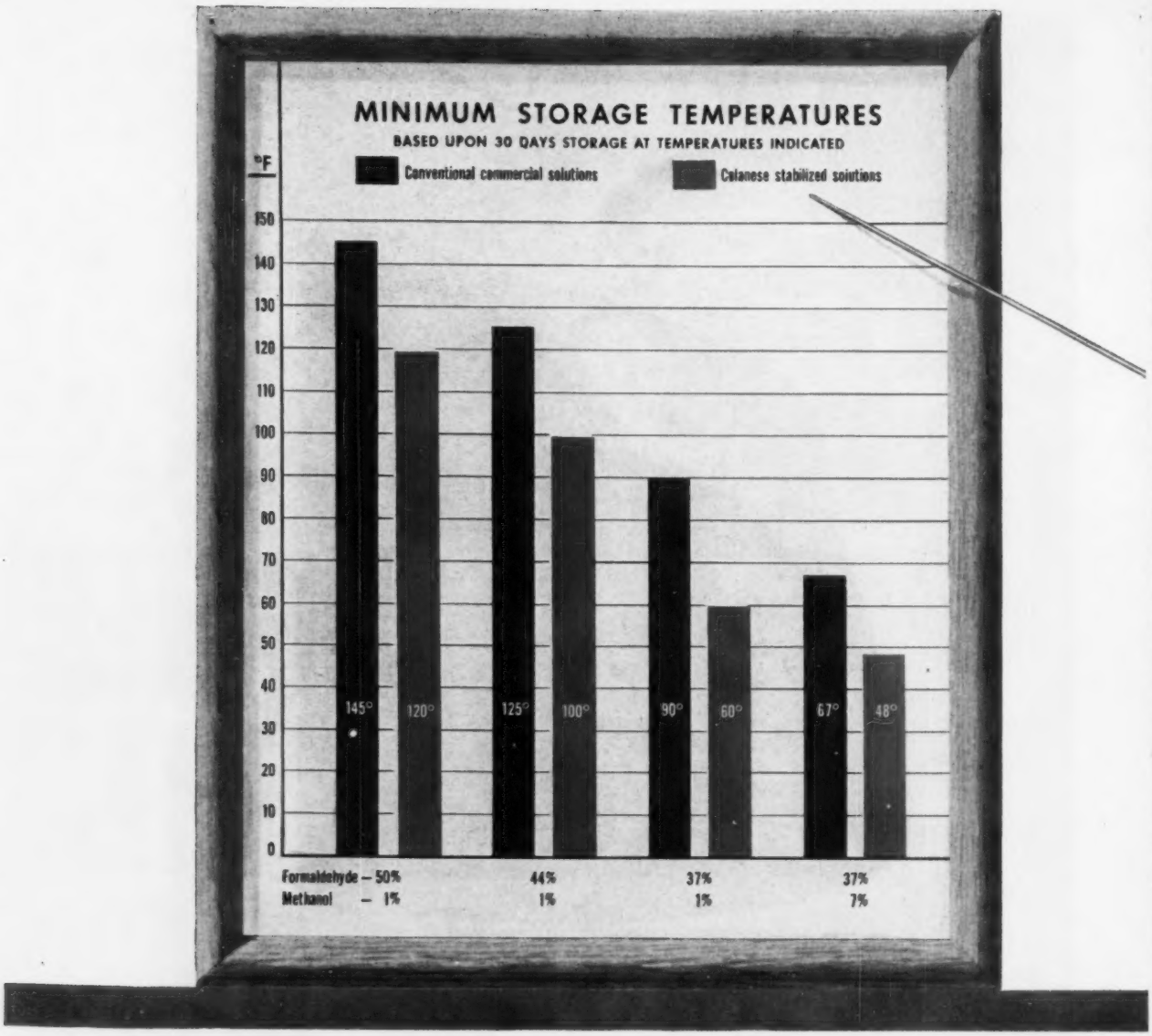

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. . . CPI needs for gas are still growing

ments of coal by barge from western Kentucky. His conclusion: coal is not yet competitive with natural gas in the Baton Rouge area even on a straight Btu. basis because of the shipping costs.

Natural gas costs are going up faster than coal costs, however, and the differential is narrowing. A continuation of current trends would mean that gas and coal would become competitive on a Btu. basis in '68 at roughly 30¢/million Btu. However, Burk calculates a 7¢/million Btu. penalty for coal—so that the two will not be actually competitive until sometime after '75. Then, gas would sell for approximately 42¢/million Btu. and coal for 35¢/million Btu.

He assumes that coal (and shipping) costs will continue to rise—although at a somewhat lower rate than gas. Significant: his figures show that the cost of natural gas at which coal would now be competitive is 32-33¢/-1,000 cu. ft.

However, the coal industry has posted an impressive record since '48 in holding down prices through increased mechanization. And some feel that it will continue to improve its position relative to other fuels. They feel that 29-31¢/1,000 cu. ft. to the customer is the ceiling price of gas imposed by coal in the Southwest.

Rise of Chemicals: The choice of coal or gas for chemical processing is considerably more complicated.

Mares and Groppe (Houston) estimate that the process industry is the largest single outlet for natural gas (*see chart, p. 68*), taking 29.2% of all the nonfield uses††.

About half of this (4,110 million cu. ft. daily) was for direct process use—kilns, heaters, driers, etc. The remainder (4,063 million cu. ft.) went to indirect applications—steam and power generation. Chemical raw materials, including carbon black, took another 925 million cu. ft. (3.3% of the total).

Other significant finds from the Mares and Groppe study: in '47 the six process industry members in the chart used 3,402 million cu. ft./day, or 24.8% of the total gas. Chemicals took only 315 million cu. ft. of this, placing fifth among CPI customers. In '58, the same six industrial segments took 8,173 million cu. ft./day. Chemicals accounted for a whopping 2,100 million cu. ft. of this and moved into first place among the CPI. It means the chemical industry now gets 29% of its total energy requirements from natural gas.

In indirect process applications, gas has to stand up to the same harsh economic comparisons with other fuels that it does in any industrial use. However, in the direct uses, there are offsetting technological advantages to using gas that are hard to measure.

Recent trends may serve to reinforce these hard-to-measure pluses. For instance, better metallurgy is permitting higher and higher processing temperatures. And it's at the higher temperatures that gas really shows off to best advantage. Also, there's a decided trend toward wider use of catalysis. Since air pollution is becoming an increasingly worrisome problem, this means contaminants must be burned off in the most efficient manner. That means natural gas.

In the case of natural gas as a chemical raw material, advantages are even more clear-cut. Even the most ardent advocates of coal don't see any appreciable swing to coal as a raw material, except in isolated cases, for 20 years at least.

Growth on Growth: The outlook then is that the CPI in general and the chemical industry in particular will continue to increase its take of natural gas. This is pointed up by a recent study by Roger Conkling (H. Zinder & Associates) made for a presentation before the FPC by the CATC companies (Continental, Atlantic, Tidewater, Cities Service).

Conkling broke down the industrial requirements of Texas and Louisiana for '53 and '58, then projected their needs for the next five years. In '58, chemical manufacture used 259,472 million cu.ft.††† in Texas and 99,546 million cu. ft. in Louisiana. By '64, he anticipates a growth in the two states to 397,500 million cu. ft. and 138,000 million cu. ft., respectively.

It adds up to a 49% increase in the two states, from 359,018 million cu. ft. in '58 to 535,500 million cu. ft. in '64.

Since it isn't likely that rising gas costs will become competitive with those of coal in the Southwest for at least 10 years and probably longer, it's safe to say that chemical processors and other industrial customers will continue to increase gas consumption right across the board. When the gas-coal cost spread disappears, indirect process applications will be first to give way to coal. The small, but important, use of gas as a chemical raw material will probably be the last to be dislodged.

Imports, Off-Peak Sales: Two other possibilities could effectively lengthen natural gas's "life"—imports and better utilization of off-peak sales.

Early last month, the Canadian government reversed a previous stand and decided to permit large-volume natural gas exports to the U.S.

Canadian gas will receive a warm welcome here. And it will mean a tremendous boom for Canadian gas and oil. Canadian and U.S. interests combined have sunk some $200 million in Alberta gas wells, which have been standing capped for lack of domestic markets. Exploration there has come almost to a halt since Alberta oil has been squeezed out of the market by cheaper Middle East and Venezuelan oil.

There is also the distinct possibility of large-volume imports from Mexico. The successful voyages of a vessel, *Methane Pioneer*, in transporting liquefied methane hold out the hope that the U.S. may be able to bring in gas from Venezuela or more distant points.

There are so many political ramifications to the importa-

†† Field uses which include applications such as compressor power in transmission lines consumed 1.6 trillion cu. ft. in '58.

††† Conkling's figures for Texas and Louisiana amount to 79% of the totals Mares and Groppe list for direct and chemical raw-material use (excluding carbon black) in the whole country.

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Color	Straw	Light Amber

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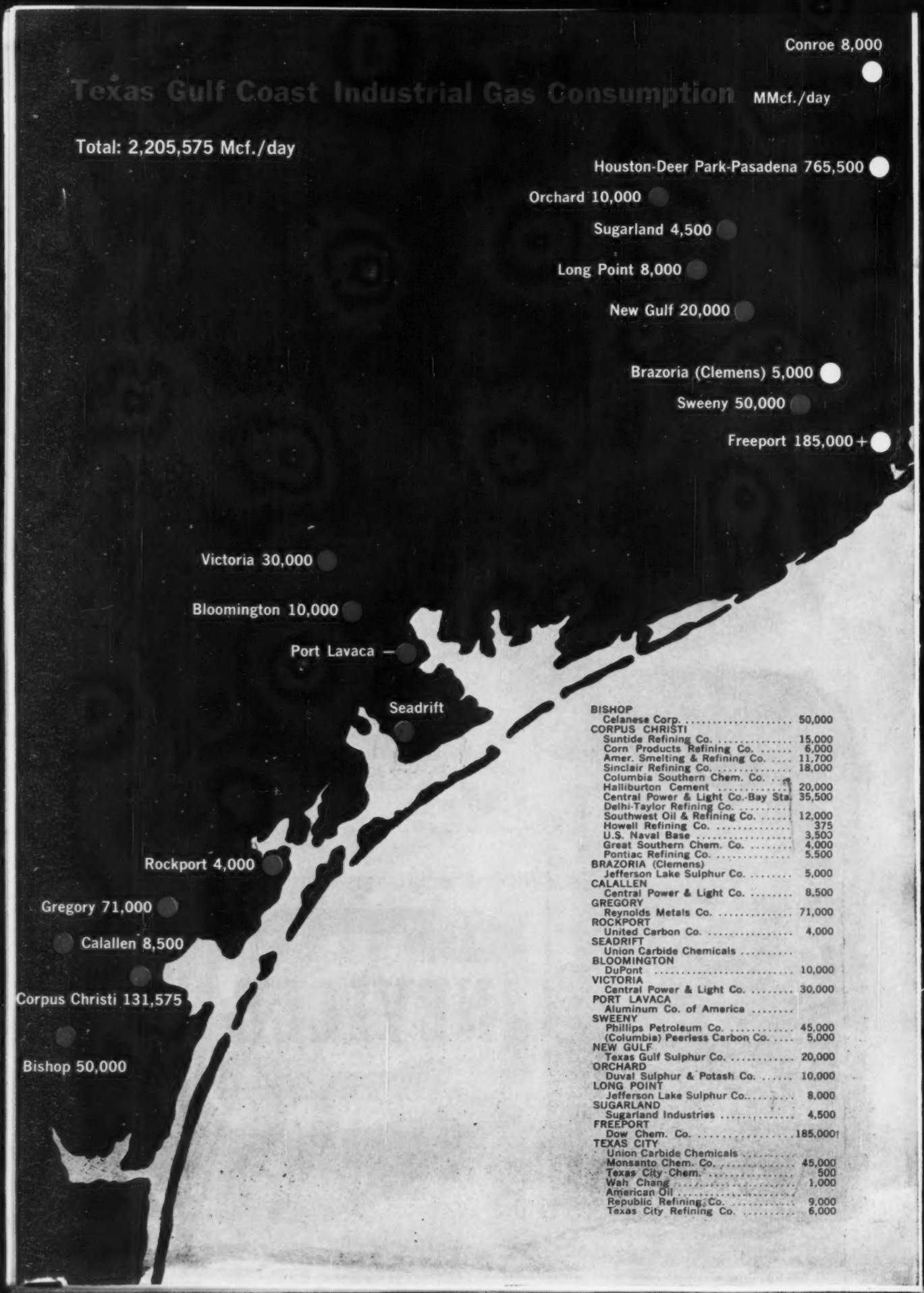

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Corn Products Refining Co.	6,000
Amer. Smelting & Refining Co.	11,700
Sinclair Refining Co.	18,000
Columbia Southern Chem. Co.	20,000
Halliburton Cement	
Central Power & Light Co.-Bay Sta.	35,500
Delhi-Taylor Refining Co.	
Southwest Oil & Refining Co.	12,000
Howell Refining Co.	375
U.S. Naval Base	3,500
Great Southern Chem. Co.	4,000
Pontiac Refining Co.	5,500
BRAZORIA (Clemens)	
Jefferson Lake Sulphur Co.	5,000
CALALLEN	
Central Power & Light Co.	8,500
GREGORY	
Reynolds Metals Co.	71,000
ROCKPORT	
United Carbon Co.	4,000
SEADRIFT	
Union Carbide Chemicals	
BLOOMINGTON	
DuPont	10,000
VICTORIA	
Central Power & Light Co.	30,000
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Aluminum Co. of America	
SWEENY	
Phillips Petroleum Co.	45,000
(Columbia) Peerless Carbon Co.	5,000
NEW GULF	
Texas Gulf Sulphur Co.	20,000
ORCHARD	
Duval Sulphur & Potash Co.	10,000
LONG POINT	
Jefferson Lake Sulphur Co.	8,000
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Sugarland Industries	4,500
FREEPORT	
Dow Chem. Co.	185,000†
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Union Carbide Chemicals	
Monsanto Chem. Co.	45,000
Texas City Chem.	500
Wah Chang	1,000
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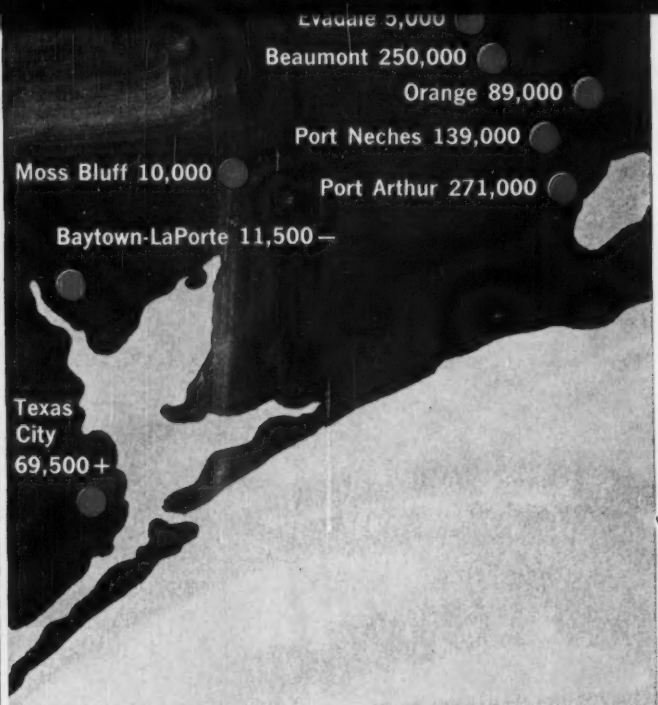

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Warren (Gulf) Petroleum Co.	6,000
BAYTOWN – LaPORTE	
Humble Oil	
United Rubber & Chem. Co.	2,500
J. M. Huber & Co.	3,500
DuPont	2,500
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San Jacinto Chem.	7,000
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Crown Cent. Petroleum	15,000
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Eastern States Petroleum	40,000
Lone Star Cement	12,000
Ideal Cement	15,000
Petro-Tex Chem.	
Sinclair	40,000
Houston Light & Power	350,000
Celanese Corp.	2,000
U.S. Industrial Chem.	2,000
Texas Butadiene Chem.	28,000
Consolidated Chem.	1,000
Trinity Cement	12,000
U.S. Gypsum	2,000
Butler Chem.	500
Hess Term.	1,000
Diamond Alkali (Kolker)	500
Lubrizol	500
Nyotex Chem. Co.	500
MOSS BLUFF	
Texas Gulf Sulphur	10,000
EVADALE	
East Texas L. & P. Co.	5,000
BEAUMONT	
Magnolia Petroleum Co.	105,000
DuPont	500
Texas Gulf Sulphur	10,000
Gulf St. Util.	125,000
PORT NECHES	
Pure Oil	16,000
Texas Co.	5,000
Jefferson Chem.	17,000
Neches Butane	100,000
Magnolia Petroleum Co.	1,000
PORT ARTHUR	
Atlantic Refining Co.	6,000
Great Lakes Carbon	2,000
Koppers	2,000
Texas Co.	55,000
Gulf Oil	200,000
Texas Gulf Sulphur (Fannett)	6,000
ORANGE	
DuPont	70,000
Allied Chem.	2,500
Spencer	2,000
Firestone	9,000
Orange Pulp & Paper	3,000
Texport Cement Co.	2,500

tion of gas, however, that even the most venturesome observers hesitate to express an opinion on the outlook.

The question of off-peak sales is crucial to the entire energy pattern. The problem is that pipelines are built to deliver a maximum amount of gas to customers for space heating during the cold winter months. During the summer, this market almost disappears.

Pipeline companies can't afford to operate their lines for small loads, so they will frequently sell gas at a price attractive to industrial customers.

A better alternative is to store the gas during the summer and this is an increasingly popular gambit. According to the American Gas Assn., total underground storage capacity at the end of '58 was 2.7 trillion cu. ft.

Another way to sidestep the off-peak problem is to develop a different, premium market. One of the gas industry's brightest hopes along those lines is the use of gas for air conditioning (*see p. 49*).

COAL—HEADING FOR A COMEBACK

Supplies of coal in the ground dwarf reserves of other fuels. The industry is constantly raising productivity. It has written off the markets already lost through technological change, is banking heavily on the electrical companies for future growth. But it resents off-peak sales of natural gas and imported residual oil. What it would like more than anything else is a national fuels policy. Petroleum people would like nothing worse.

According to the U.S. Geological Survey, mineable reserves of coal amount to 1.213 trillion tons—616 billion tons of bituminuous, 234 billion tons of sub-bituminous, 356 billion tons of lignite, 7 billion tons of anthracite and semi-anthracite. This was predicated on 50% recovery.

The problems of the coal industry have been well documented. It lost first the home heating market (to gas) and then the locomotive market to diesel oil.

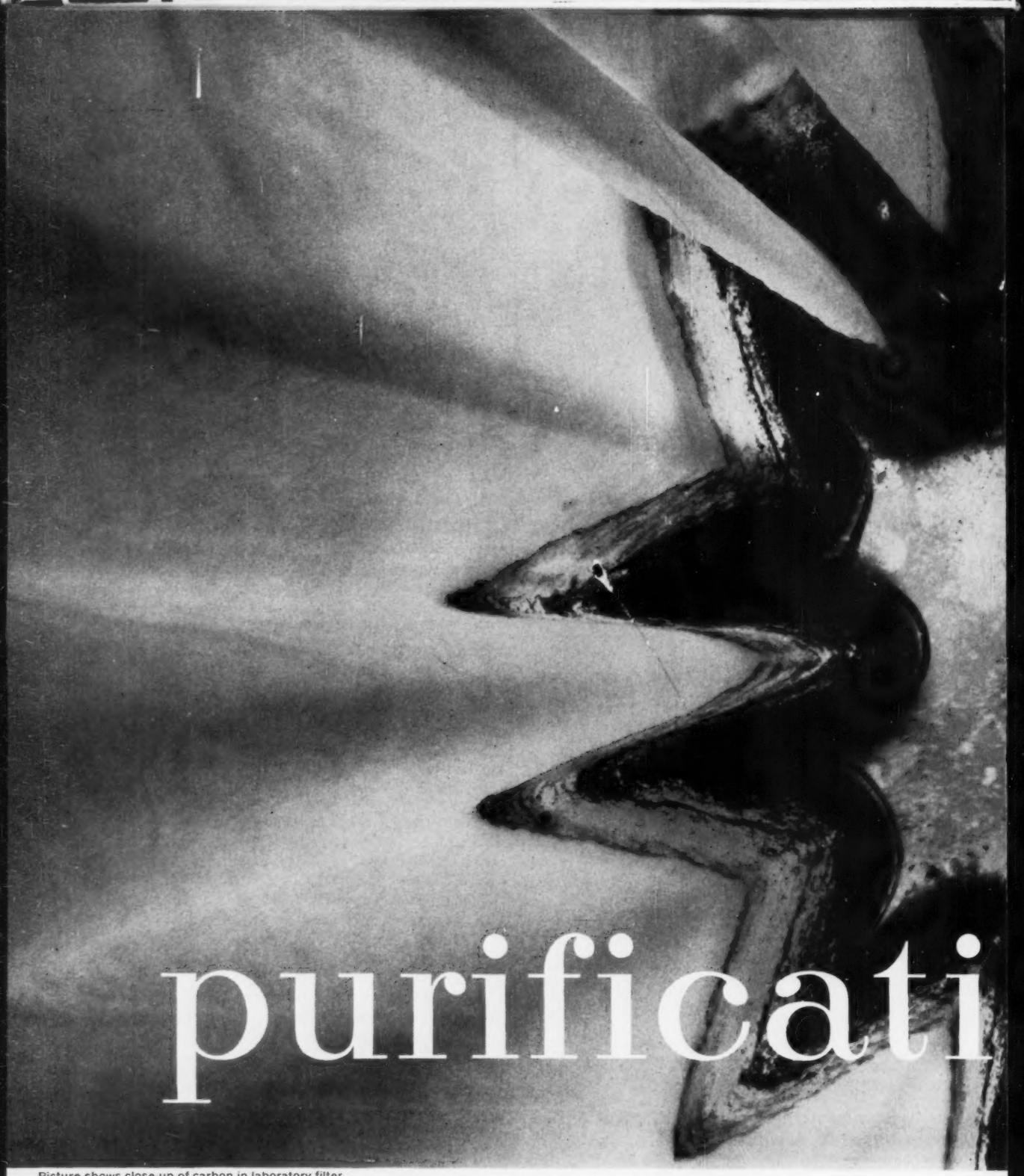
As a result, bituminous coal production fell from 631 million tons in '47 to 600 million tons in '48 and declined steadily, to a low of 392 million tons in '54.

Since that time, however, coal has given indication of rebounding. Production hit 501 million tons in '56 and 493 million tons in '57. But, just as things started looking up, the '58 recession did its work and production dropped to 410 million tons; '59 tonnage was likely the same.

Moreover, it turned out that part of coal's rebound was illusory. The gains made in '56 and '57 partly reflected an unusual electric-generating load for the atomic energy program and an unusual demand for coal during the Suez crisis.

Gas and Oil: But it's the off-peak sales of natural gas and the imports of residual oil that are really bothering the coal people now. You can best appreciate their reasoning by looking at a specific case:

Tennessee Gas Transmission was buying gas at an average cost of 15.74¢/1,000 cu. ft. Some of this gas, however, cost 23.4¢. Estimated cost for transporting it to Chicago was 21.5¢, bringing the price at Chicago "city gates" to 37.2¢. Because the gas had to sell to the industrial cus-



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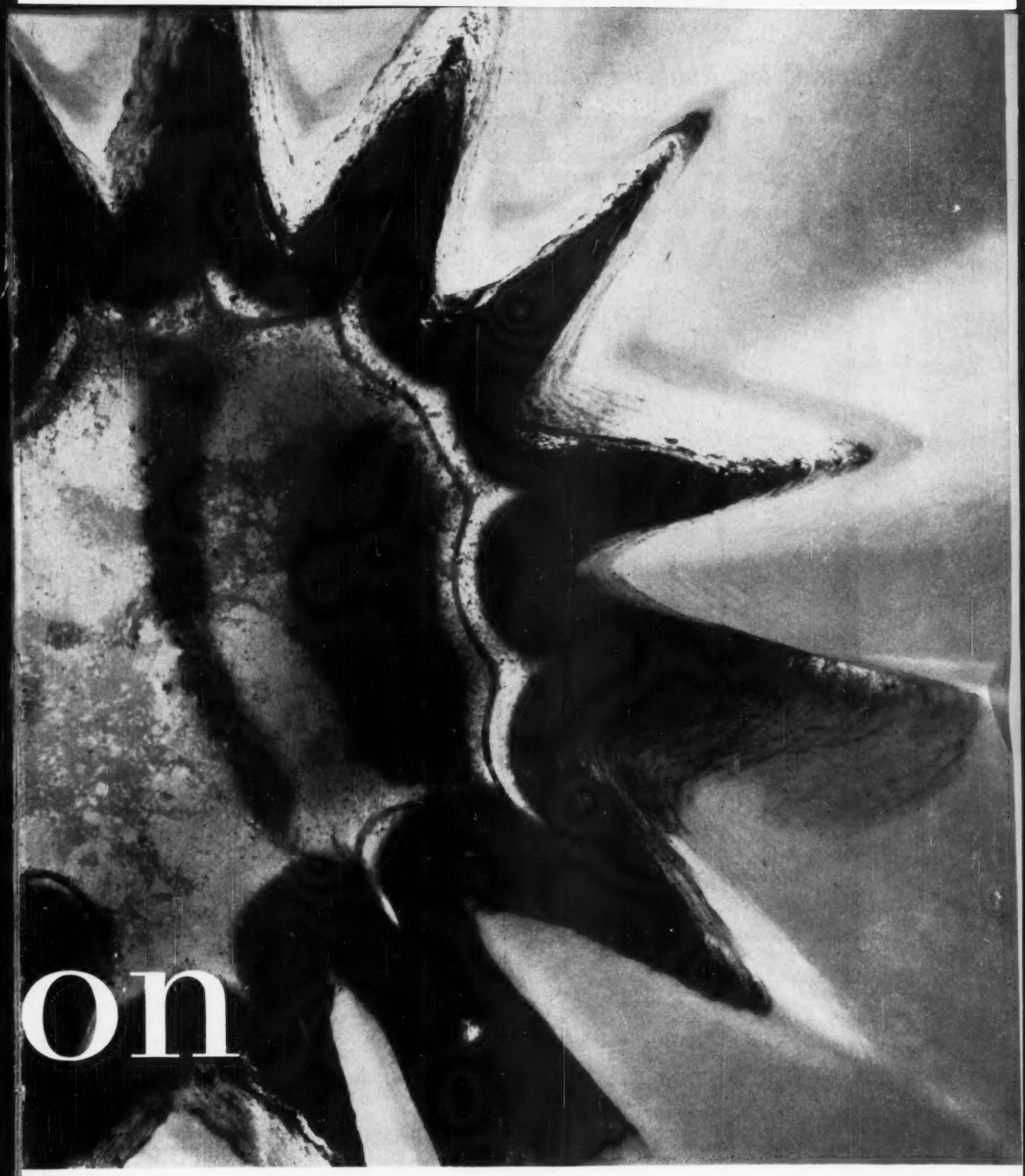

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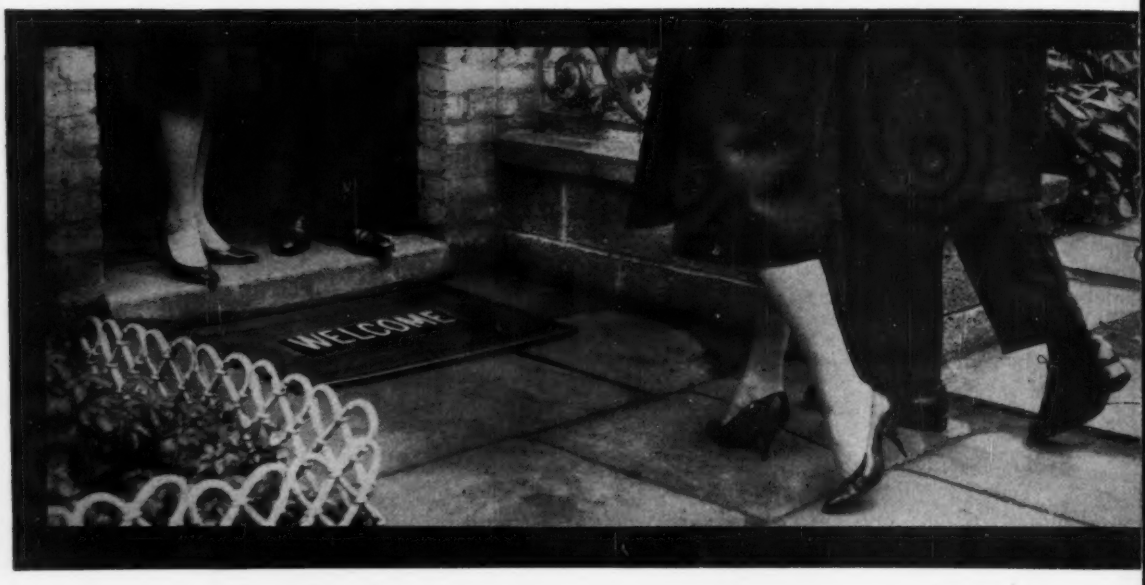

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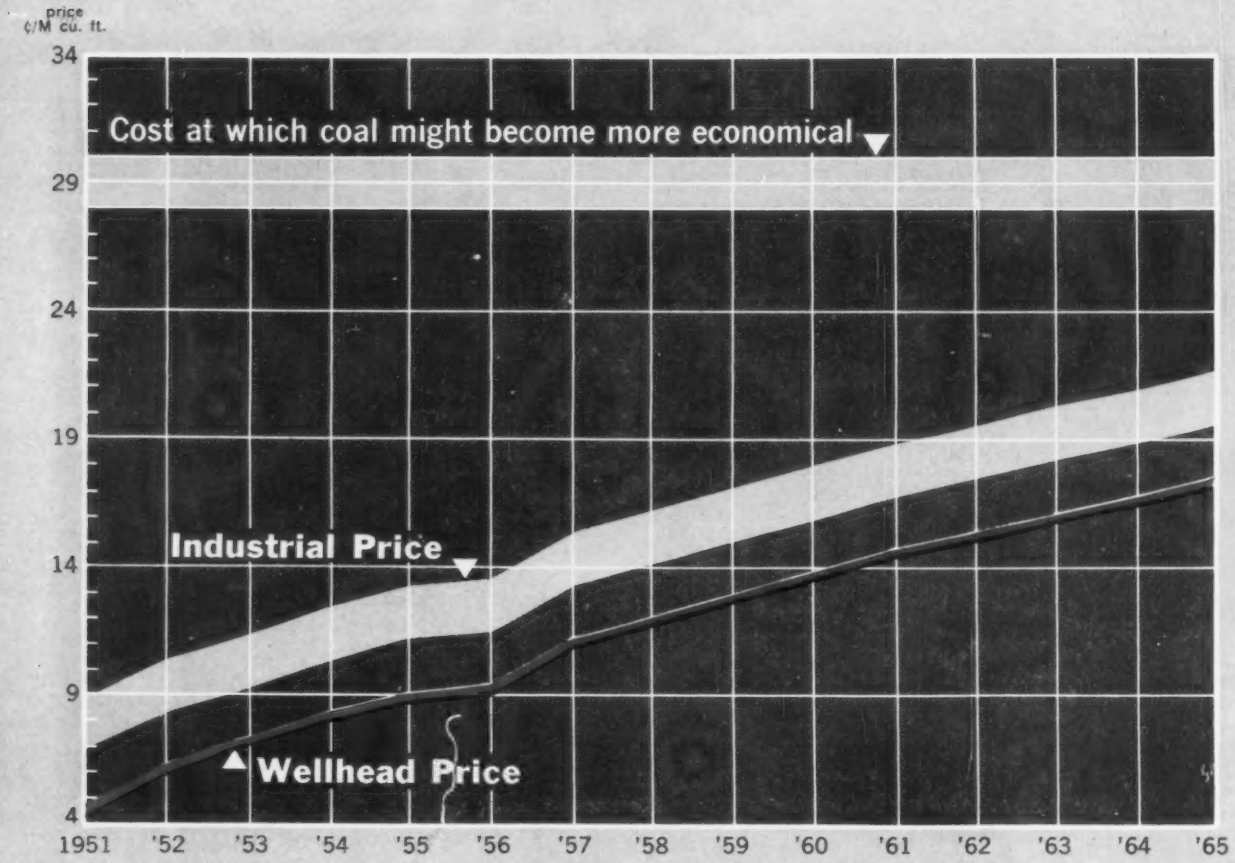
Texas Gas Prices Still Climbing



tomers for 25¢ to compete with coal, the natural gas was sold to the distributor for 22¢ during the "off-peak."

And that's when the coal people cried "dump." When gas that costs 23.4¢/1,000 cu.ft. is sold for 22¢/1,000 cu.ft., they maintain, the gas is being sold below cost and it's a clear case of dumping.

The gas people argue just as vehemently that pipelines are built to serve fluctuating seasonal demands of residential customers. Regardless of whether the line is used or not, certain fixed expenses (e.g., depreciation) go on. Therefore, they say, whatever they can get from industrial customers, over the average cost of the gas and other nominal charges, helps keep the price down for the residential customer. Industrial sales in the off-peak season, they say, can sometimes make the difference between being able or not being able to build a pipeline.

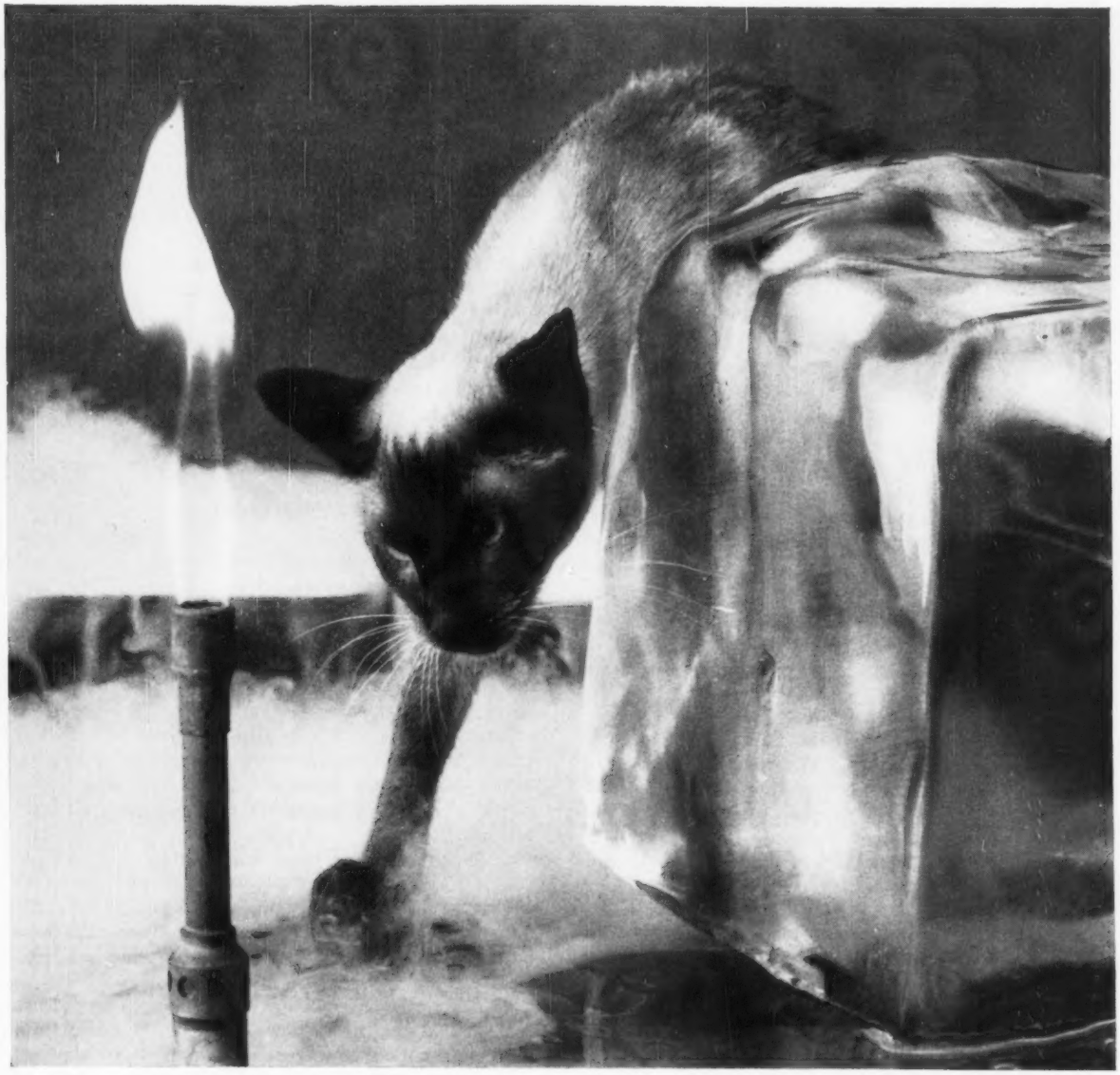
The same kind of controversy is raging with regard to imports of residual oils. The coal industry contends that refiners are bringing in foreign residual oils at dump prices and underselling coal for electric generating plants along the Eastern seaboard. They state that the oil industry can afford to do this because it has several products and can recoup losses on one by hiking prices on the others. But coal can't do this because it competes with oil and gas for its main market: power generation.

The oil industry's answer runs something like this: far from resulting in increased prices to other customers, the ability to market all its products permits the oil industry to sell to all customers at the lowest possible price. The residual oils which the coal people are complaining about are not by-products, but prime products, of the heavy crudes processed in Latin America. Finally, it says good, healthy competition keeps prices of all fuels low, helps assure the customer of getting the best buy.

Last April the government added residual oil to its mandatory oil imports program. Quotas are based on '57 imports. But the coal industry is now charging that the big residual oil importers (e.g., Jersey Standard, Texaco, and Hess, Inc.) are trying to "sabotage" the program by using up quotas before the period is over, then complaining of a shortage. Object: to get higher quotas.

Matter of Policy: The total market lost by coal as a result of off-peak sales of gas and imports of residual oil is relatively small. Consolidation Coal's George Lamb pegs it at 20 million tons/year, or about 5% of the total market for bituminous coal. But he says the damage tends to concentrate in certain fields and thereby undermine the whole price structure. And actually the harsh feelings between the two groups on off-peak sales and residual imports are merely surface expressions of a much-deeper disagreement on the advisability of a national fuels policy.

The coal people would dearly love such a policy. Oil



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. . . coal's hope for growth is in electricity

people are already complaining about government regulations and are convinced that a national fuels policy would be a fatal blow to private enterprise. Both can marshal some strong arguments to support their positions. For example:

Oil charges. The coal industry wants end-use control. It wants to see a government agency tell the customer what fuel he could use for what purpose. But the only practical end-use control is an economic one. When a fuel gets too expensive for a given application the customer himself will decide to make the change.

Coal answers. We don't want end-use control. All we ask is that an impartial body of Congress examine the whole energy problem and decide whether or not a national fuels policy is in the best interests of the country.

Coal charges. Petroleum people complain about the harm of government regulation. It's a fact, however, that the petroleum industry is already subject to regulation—gas through the FPC, crude oil through the imports program, and both through the various state agencies set up to control oil and gas production. But these individual agencies necessarily reach narrow decisions, based on the fuel over which they have control. We think that such decisions should be reached by a body that takes the entire energy picture into account.

Oil answers. The FPC decisions are not narrow at all. Coal interests can—and frequently have—intervened in natural gas cases. Coal has had plenty of opportunity to present its case before the FPC.

Coal charges. For the past 30 years, every commission, agency or study group that has looked into the energy picture has urged that an integrated fuels policy be adopted by the government.

Oil answers. We have a national fuels policy and it works. It's based on the theory that economic competition prevails among the various fuels and that research should overcome the handicaps of the so-called "inferior fuels." Further, the fact that many government bodies have looked at the problem shows that it is not being neglected. Just last fall, a joint economic committee held hearings on automation and energy resources. The hearings proved that an ample supply of energy sources will be available for the foreseeable future at a reasonable cost under the proper economic atmosphere.

Holding the Line: Fuel policy aside, coal men are viewing the future with cautious optimism. They feel that they've lost markets that were vulnerable because of technological change.

Average price of coal (f.o.b. mine) was $4.99/ton in '48. In '58 and '59, it was only $4.86/ton. This has happened, moreover, at a time when the basic day wage increased from $13.35 (in '48) to $22.25 (in '58). And average weekly rates increased 8.2% last year. It has meant a big increase in productivity—from 6.3 tons in '48 to 11.3 tons/man-day in '58.

The industry is convinced it can do even better. The average productivity for strip mining is now 22, while that of underground mines is 9. But some of the best underground mines are hitting 25. Coal people expect that productivity will double again within the next 10-15 years.

Where It Goes: In '59, electric utilities took 166 million tons of coal (40.5% of the total 410 million tons production); coking coal accounted for 79 million tons (19.2%) and generation of industrial steam took 92 million tons (22.4%). The rest went for retail deliveries, export and inventory (7 million tons).

And those figures pretty much sum up coal's future. Indications are that in '60 utilities will need 8 million tons more, cokers 21 million tons more. Requirements for the other categories will probably fall off slightly. For the long range, coal's hopes lie with the utilities.

No significant boosts in coal consumption can be expected for coke-making, because—while steel production is climbing—the blast furnaces are learning how to get by with less coke. In '57, 1,704 lbs. of coke were needed to produce a ton of pig iron. This dropped to 1,613 lbs. in '58 and the average is now 1,500-1,600 lbs. Moreover, the most efficient furnaces require less than 1,100 lbs. of coke. New developments—e.g., the use of coke oven gas or natural gas (*CW, April 23, p. 53*)—will have a more pronounced effect on the use of coke in steelmaking. It means that the steel industry will be able to expand considerably without a concurrent expansion of coke oven capacity.

Utilities are getting more mileage from coal, too. In '47, 1.31 lbs. of coal were needed to generate 1 kwh. of electricity. By last year, it had dropped to 0.89 lbs./kwh. There probably won't be any significant change this year. But the most efficient units now are using less than 0.6 lbs./kwh.

The increased efficiency of the utilities is more than compensated for by the spiraling electrical demands of the country. Coal now supplies two-thirds of the fuel requirements for electric power generation. In '80, it expects to do about the same. That translates into a market of 510 million tons of coal.

In fact, coal people are as enthusiastic about the prospects of electricity increases as are the utilities themselves. They have long since realized that coal cannot directly compete with gas or oil in many applications. But they feel that coal is now moving into a position where it can compete indirectly—through electricity.

In the home-heating market, for instance, they point to an estimated 1 million units that will be heated electrically by the end of this year. Moreover they say that half of these represent conversions from gas or oil.

Chemicals and Coal: Coal's changing fortunes will work upon the CPI from two directions: (1) in the latter's utilization of electricity; (2) the possibility that, at some future date, coal will become an important chemical raw material.

The importance of electricity for the CPI is clearly outlined in the chart (*p. 90*). The chemical process industries (including primary metals producers) bought 182,663 billion kwh. of electricity in '57—70.6% of all the in-

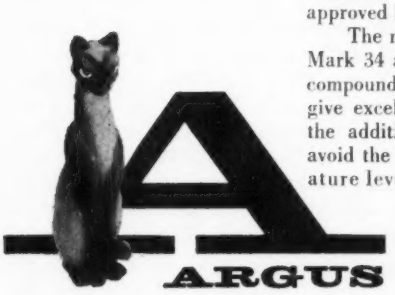
NOW RIGID VINYLS CAN BE MADE NON-TOXIC

Argus announces three new products—*non-toxic* stabilizers that *withstand the high heat needed to process unplasticized vinyl.* They provide stability superior to that of any non-toxic stabilizer previously available. All three are approved by the Food & Drug Administration.

The new, non-liquid stabilizers—Mark 33, Mark 34 and Mark 35—may be used in rigid compounds as the sole stabilizer system, and give excellent stability. They do not require the addition of epoxidized oils. Thus, they avoid the reduction in heat distortion temperature level and the loss of other important physical properties that occur with liquid-type stabilizers. They are suggested for use in extruded thin unplasticized film, rigid calendered sheet and plasticized non-toxic products.

Mark 33 gives exceptional long-term heat stability in rigids. It is recommended for pigmented or darker stocks. *Mark 34* is recommended where crisp, initial color is required, and provides good clarity. *Mark 35* gives better initial color than Mark 33, and longer stability than Mark 34.

Call or write for more information and bulletin.

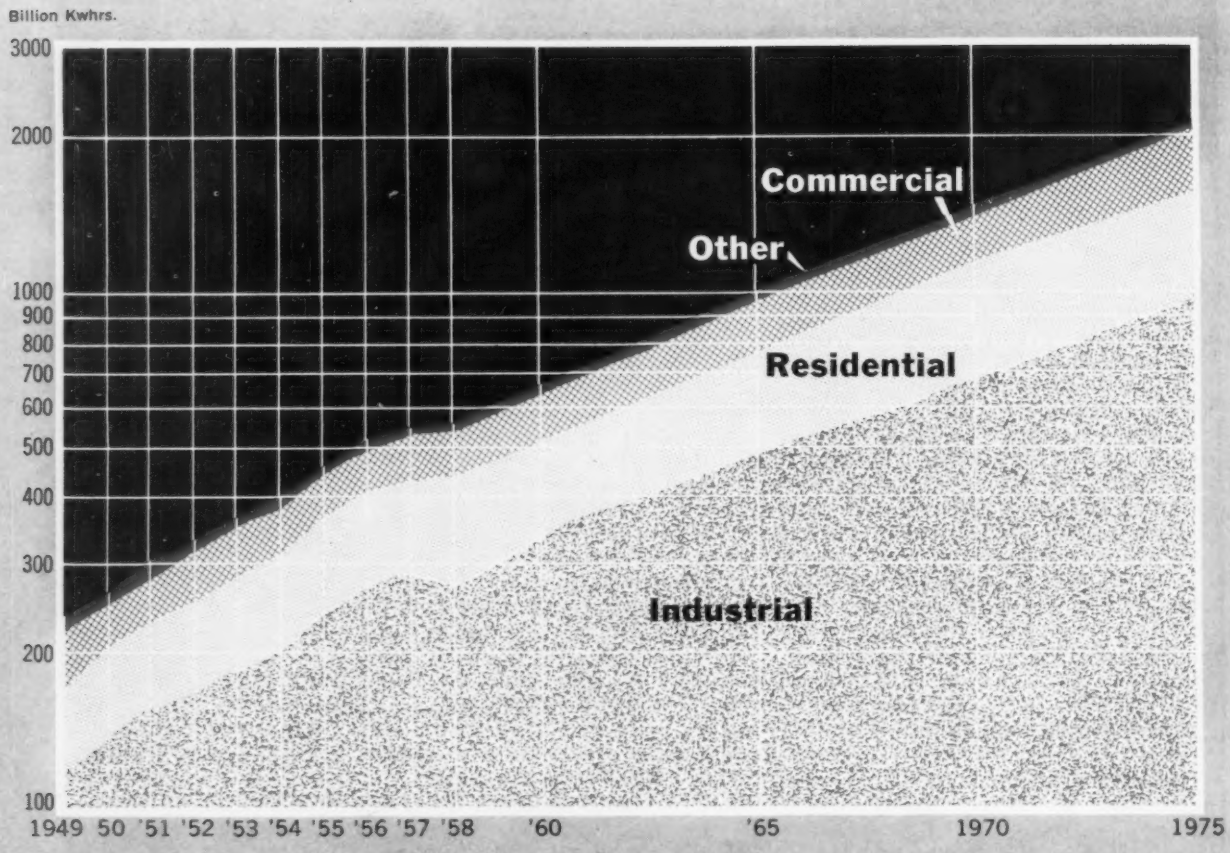


ARGUS CHEMICAL CORPORATION / New York and Cleveland

Main Office: 633 Court Street, Brooklyn 31, N.Y. Branch: Frederick Building, Cleveland 15, Ohio

Rep's.: H. M. Royal, Inc., 11911 Woodruff Ave., Downey, California; Philipp Bros. Chemicals, Inc., 10 High St., Boston; H. L. Blachford, Ltd., 977 Aqueduct St., Montreal. European Affiliates: SA Argus Chemical NV; 33, Rue d'Anderlecht, Drogenbos, Belgium—Lankro Chemicals, Ltd.; Salters Lane, Eccles, Manchester, England.

Total Electric Energy Sales



dustrial electricity sold that year. And it generated an additional 69,200 billion kwh. for its own use.

The chemical industry has risen to the nation's No. 1 industrial user. In '57, it bought 87,940 billion kwh. and generated another 16,923 billion kwh. for itself. However, it's risky to try to extrapolate such requirements. Reason: they include the huge electrical requirements of gaseous diffusion plants. The entire Oak Ridge operation (which includes the U-235 separation plants at Oak Ridge, Tenn., Paducah, Ky., and Portsmouth, O.; the feed-materials facilities at St. Louis; and area offices) requires 57 billion kwh./year. Even subtracting that, however, the chemical industry used 30.9 billion kwh. in '57.

Prospects of making chemicals from coal seem fairly remote at the moment. Considerable work is under way in an attempt to make high-Btu. pipeline gas as a substitute for natural gas. One approach is to make synthesis gas from the coal, then convert the synthesis gas into methane.

The Bureau of Mines at Bruceton, Pa., is doing a lot of work in the field. A hot-gas recycle for converting the synthesis gas into methane is "being hit pretty hard right now," according to Richard Corey, chief of the Solid Fuels Technology Division at Pittsburgh. In this method 99% of the synthesis gas is converted into a gas with a Btu. value of 983-1,130/cu. ft., using a steel catalyst followed by Raney nickel. Estimated cost of gas so produced varies widely—upwards from 80¢/1,000 cu. ft.—but $1.25 is probably a realistic estmate.

Bureau investigators feel that the use of nuclear heat in the synthesis gas generation holds real possibilities for cost reduction, possibly 15-20%. In this approach, coal and water are slurried, fed to a preheater and then to the gasifier. There it would be heated by helium (from the reactor). Synthesis gas would be drawn off the top, ash and slag would be dropped out the bottom. So far the process is largely conceptual; since it has no nuclear reactor, the bureau has had to use induction-heated graphite spheres to simulate reactor elements. But the bureau is working with AEC to test the process at Los Alamos.

Working at making methane from coal is the Institute of Gas Technology (Illinois). In fact, IGT and the Bureau of Mines are cooperating on some aspects of the problem. In addition to methanation, IGT is looking at a process that produces methane directly from coal or oil shale by reaction with hydrogen (hydrogasification). As Martin Elliot, IGT director, sees it, the U.S. will eventually have to start making methane from coal or shale. He believes that this operation may never be needed in the Southwest, but that New England might require it within 15 years; the Midwest, in 25.

He reasons further that the lead-time is none too long. He says the institute staff estimates it will take another

DRAPEX 7.7 BLOCKS STAINING—2 WAYS

Drapex 7.7, a primary plasticizer with polymeric properties, gives vinyls built-in resistance to stains. It *blocks stain penetration* from the top surface down and from the underside up. This explains its growing use in such vinyl products as floor tile and upholstery.

The low solvating rate of most polymeric plasticizers often causes processing difficulties. Because Drapex 7.7 has a very high rate of solvation, this problem is largely overcome. Similarly in plastisol or organosol coated fabric, through the use of Drapex 7.7 to increase fusion rate, polymeric properties may be obtained without the usual stringent heat conditions which often cause scorching of the fabric backing.

Drapex 7.7 gives vinyls low volatility and excellent resistance to extraction. Recommended for products coming in contact with chemicals—tank linings, vinyl coated gloves, etc.—and where resistance to lacquer marring is important.

Write for technical bulletin on Drapex 7.7 including results of stain tests.

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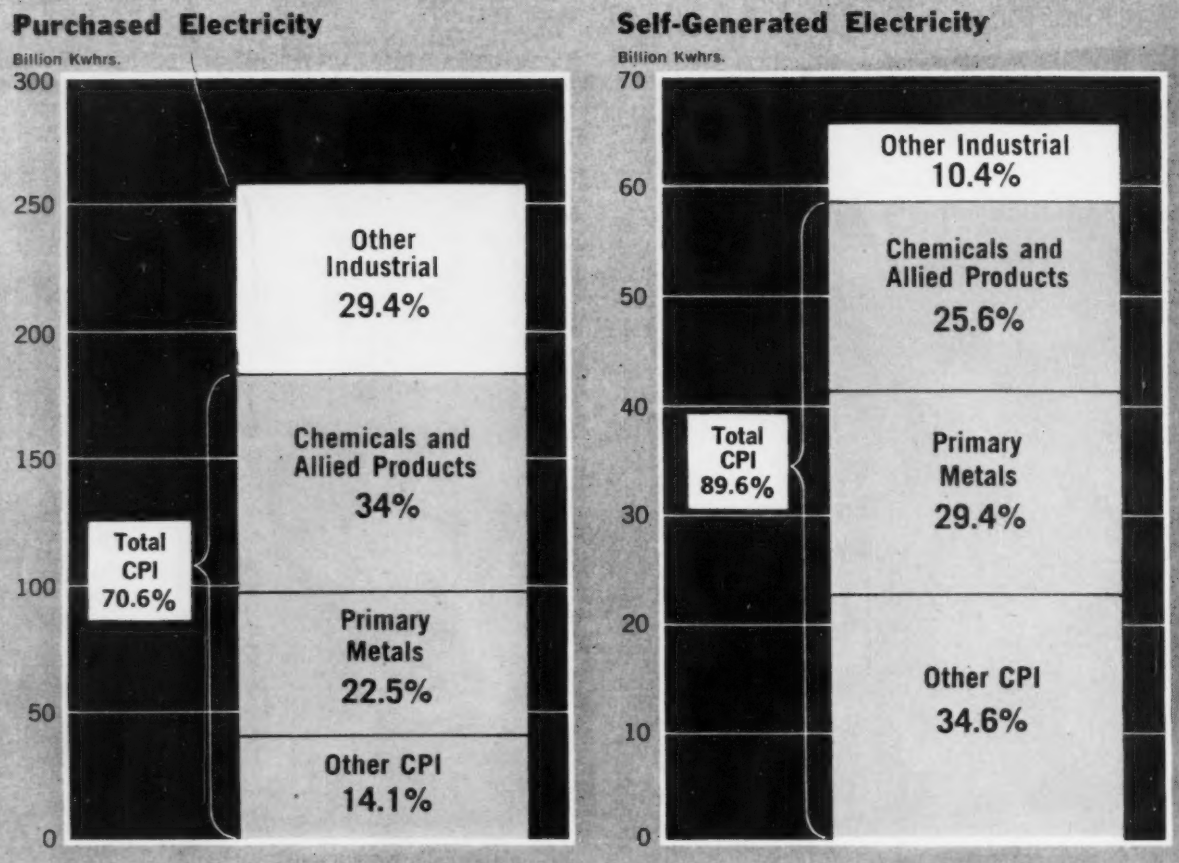
The Power-Hungry CPI



nine years to develop a process, build a large-scale plant and operate it long enough to get sufficient data for designing additional ones. If troubles crop up, it could take 16 years.

Elliot recognizes the potential importance of gas imports from Canada and Mexico as well as that of liquefied gas shipments. He feels, however, that these cannot be relied upon as a source of long-range supply.

Long Way Round: The idea of converting coal-derived synthesis gas into methane is not very attractive to the chemical industry, which goes to considerable expense to do exactly the reverse. The Bureau of Mines and IGT, however, are working in that direction: the bureau to develop a large-volume use for coal; IGT to assure a long-range gas supply.

Lately, the anthracite people have expressed high hopes of getting into the chemical business. Reading and Glen Alden (*CW, March 5, p. 24*) report they are proceeding with plans to use anthracite as a base for chemical operations. Anthracite is said to lend itself quite well to Lurgi gasification. But, otherwise, the problems of shipping, handling, capital investment, etc., in using anthracite are the same as those involved in bituminous. Difference: the projects might compete economically if raw-material charges for the anthracite are zero—or negligible. And that is the driving force behind Reading's project, which will be based on anthracite waste.

Looking Ahead: For the most part, however, it looks as if the chemical industry will be tied to oil and gas for the medium-term future, say 20-25 years. Evidence of this can be found in the increasingly frequent tie-ups between chemical companies and refiners.

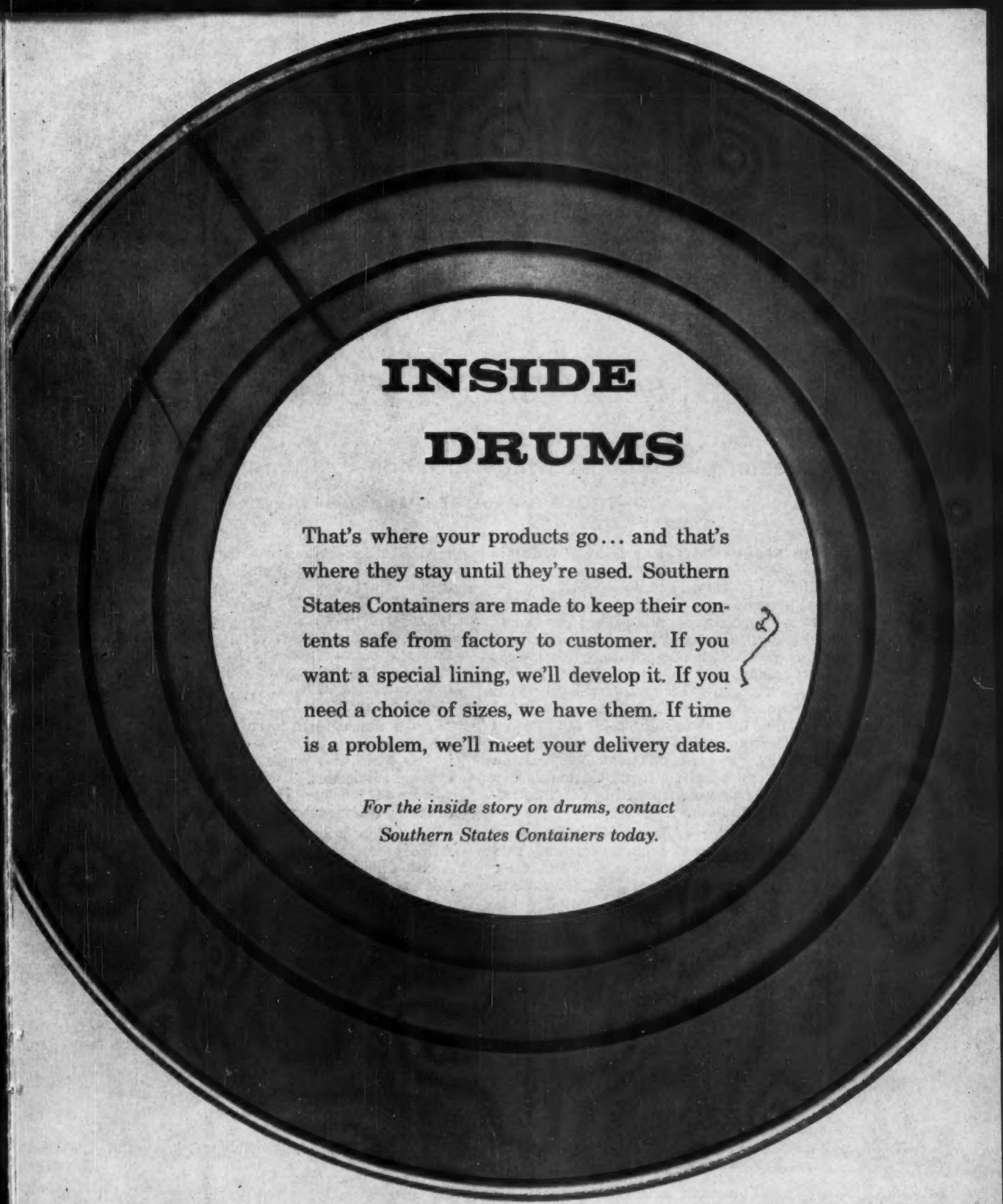
Also, there may be a trend in the making for chemical companies to buy their own gas fields. Doing that are Dow (through Brazos), Southern Minerals, Alcoa and Reynolds.

There's the possibility, too, that chemical firms will eventually buy their own crude. Carbide planned to do that just a few years ago. And the proposal has popped up at Du Pont more than once.

The factor that makes firm predictions impossible, however, is the rate of technological progress. Some of the "exotic" (e.g., fuel cells, magnetohydrodynamic, thermoelectric, or thermionic devices) means of generating electricity, could disrupt the entire energy outlook.

Fuel cells, in particular, could have wide ramifications for the CPI. They produce low-voltage, direct current, ideal for process application. And Koppers, among others, is working on fuel cells that would generate electricity and, at the same time, produce chemicals.

Success in doing that might mean that the chemical industry would become not only a big consumer of electricity but also a big producer. It would be in keeping with its established tradition of being its own best customer.



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Now, No Musty Softener Smell! Odor is virtually eliminated as a textile-softener problem with the introduction of ADM's new Adogen 442.

This is a new quaternary salt specially developed by ADM research chemists to produce a finer quality softener for commercial and home laundering. It is created through ADM's unique processing from highest purity fatty amines.

As a result, Adogen 442 is exceptionally free from objectionable odors, both in the bottle and on treated fabrics. Blindfold tests show Adogen 442 can help you cut back perfuming costs and lowers residual odor after use dramatically. Panel tests on odor showed Adogen 442 excellent commercial softeners. Comments like musty, sour and stale were replaced by delighted references to clean and fresh.

Offers Whiter Color—Adogen 442 is an exceptionally white di-hydrogenated-tallow quaternary, sold as a 75% paste in alcohol and water. Its lighter color makes it ideal for even the finest grade softeners. Commercial batches of Adogen 442 run consistently Gardner 1 to 3. This gives fabric softeners a brighter, livelier color in the bottle, whether they are white or tinted.

Non-Irritating To Skin—Dermatological tests on albino rabbits reveal that Adogen 442 is essentially non-irritating to skin. In neither the primary nor the latent skin irritation tests were any significant erythema or edema formation detected. Adogen 442 has no cumulative toxic effects.

Water dispersible Adogen 442 is soluble in polar organic solvents and many of the non-polar type. It is also compatible with non-ionics as well as other cationic surfactants. To further protect its quality, Adogen 442 is delivered in epoxy-phenolic lined drums especially designed for ADM.

For further information on Adogen 442, or other ADM quaternary ammonium compounds, write to Archer-Daniels-Midland Co., 700 Investors Building, Minneapolis 2, Minn. Research samples on request.

Industrial Bacteriostat News!

Here are new savings and new performance even in hard water in industrial bacteriostats just developed by ADM research: ADM furfuryl Adogen 446. This low-cost furfuryl quaternary combines exceptional new solubility with germicidal effectiveness.

Striking performance in Chambers tests against *Staphyloccus aureus* in 500 ppm hard water shows Adogen 446's effectiveness against gram positive bacteria. The phenol coefficient of Adogen 446 compares favorably with benzyl quaternaries and cetyl pyridinium chloride. Solubility of up to 40 per cent in tap water and 20 per cent in brine helps preserve its sanitizing efficiency under adverse water conditions. Ask us for more facts about its exceptional performance.

Low cost and germicidal effectiveness combine to make Adogen 446 a promising ingredient for hotel and restaurant sanitizers, bottle washing, floor cleaners, and a variety of industrial germicides. The long fatty chains in the new furfuryl quat gives balanced conditioning properties which may be useful in hair rinses, textile specialties, and a host of other applications. Information and development samples may be had by writing Archer-Daniels-Midland Co., 700 Investors Building, Minneapolis 2, Minnesota.

Adogen 442

The Research Chemists' Corner

ADM and Atlas Powder Announce First Gas Chromatography For Primary Amines

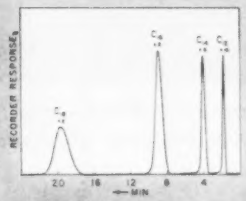
Not so long ago ADM broke the ice and revealed the first use of gas chromatography in routine production line analysis of fatty chemicals. A genuine milestone it represented in over 25 years of searching and researching for better ways of making chemicals.

But one thing had us stumped . . . try as we would, we just couldn't analyze amines because the peaks were asymetrical. But, today, things are different.

Eager beavers at our own and Atlas Powder Company's labs have jointly developed a method to make a gas chromatographic analysis directly on a primary amine. Unless you have tried and failed in this attempt, you'll probably never really appreciate how proud this moment is, even though we can't yet touch secondaries.

The method utilizes a column containing a non-polar liquid substrate on a Chromosorb W solid support which has been treated to reduce absorptivity. Relative sensitivity factors, determined for pure amines, are used to correct peaks during analysis. It works beautifully for the separation and analysis of primary fatty amines with chain length from 8 through 22.

Matter of fact, the improved color and higher purity of our new Adogens, like 442, is at least



indirectly a proud result of our growing skill in gas chromatography.

Add to this our world-wide ADM operations, which give use control of raw materials, and you see we have quite a favorable atmosphere for production and control of quality Chemifats . . . whatever their type.

Archer-Daniels-Midland

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739 Investors Building
Minneapolis 2, Minnesota

ON TELEVISION, via local Katie Doonan Show, Carbide Chemicals personnel tell polyether foam story, plug its advantages as furniture cushioning material. TV interviews were major part of three-phase secondary marketing program.

Three-Phase Community Program

OFF CAMERA, program people plan interview strategy, rehearse lines.

This week and last, Union Carbide Chemicals Co., division of Union Carbide Corp., conducted an ambitious secondary marketing program at Charleston, W. Va., near the sites of Carbide's South Charleston and Institute plants. Carbide was out to show the consuming public that polyether foam—which is made with Carbide chemicals—is becoming increasingly important as a furniture cushioning material.

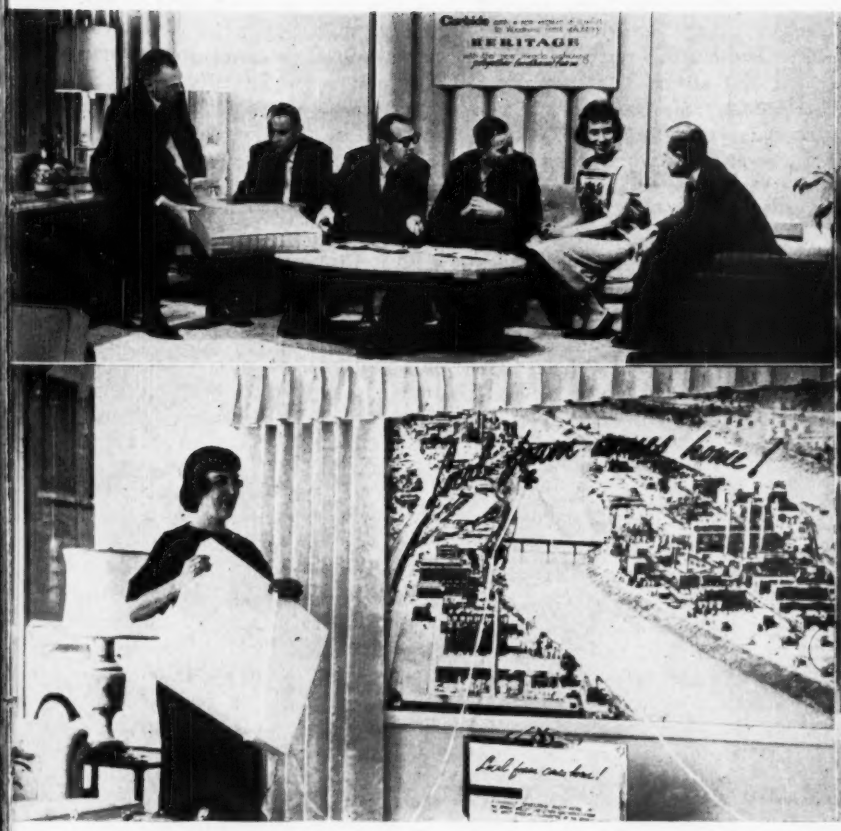
Carbide's goal: to increase its chemicals-for-foam business.

Of broader significance to the chemical process industries: secondary marketing is gaining wide acceptance as a selling technique among companies whose products do not normally enjoy recognition among the consuming public.

Simply, secondary marketing is an effort to make the consuming public aware that certain of a company's basic or intermediate products go into a given consumer item, endowing the item with special properties and qualities. Often this requires putting strong promotional emphasis on the end-product, almost ignoring raw materials.

If the secondary marketing promotion is successful, public demand for the end-product (at times, even for certain components within the product) will be created. Result: sales will increase and more raw materials will be sold. Thus, a company such as Carbide Chemicals will gain from the larger end-product market, even though its share of the raw-material market (with respect to competition) remains the same.

Carbide's Campaign: In its secondary marketing program Carbide



IN-STORE promotion featured Heritage furniture displays on each of six floors of Woodrum's furniture store (top), in the main show window (bottom).

AT PLANT, Carbide employees see display, rundown of company's role.

Plugs Hard for Polyether Foams

hopes to hike the sales of its polyether glycols (polyols), fluorocarbons and silicones by promoting the use of polyether foams in upholstered furniture.

Tied in with Carbide in the program was Heritage Furniture Co., which uses polyether foam in its furniture, and Woodrum's furniture store (Charleston), which sells Heritage furniture.

Woodrum's position as the largest furniture store in the Southeast, seventh largest by sales volume in the country, and the proximity of the South Charleston plant, which makes the polyether foam components, made Charleston the natural location for the program, according to the company. Later Carbide will carry the results of the program to its national customers.

Carbide's program promotion hit hard on three basic themes, led by the catchy slogan "Local Foam Comes Home." Other themes used were: "From Carbide to Heritage to Woodrum's to You," and "Good Things Come in Three's."

Three-Phase Program: Carbide's secondary marketing program had three phases of promotion: in-store, in-plant, and press and television (*see pictures*). Each phase was designed to tell the story of Carbide's contribution to "more comfortable furniture."

The program got under way with a press conference attended by West Virginia's Gov. Cecil Underwood; J. A. Field, Carbide Chemicals' marketing vice-president; Heritage President Elliott Wood; and Woodrum's General Mgr. Thomas Woodrum; along with other executives and civic leaders.

In-store promotion featured tabletop polyether foam-producing displays. Signs throughout the store called attention to Carbide's role in the manufacture of polyether foam, as well as to Heritage furniture displays on all floors of the six-story Woodrum's store and in the main show window (*see pictures*). In addition, Heritage salesmen and Carbide's technical personnel were on hand to answer customers' questions.

In-plant promotion featured bulletin board and card displays and Heritage furniture exhibits.

Highlight of the secondary marketing program was a series of radio and television interviews featuring Carbide Chemicals' research and marketing personnel. Ten interviews were video taped with Dick Joslin, director of new-product marketing; Dave Alcorn,

assistant manager of the New Chemicals Division; Dick Kerr, product manager of urethane intermediates; Fritz Hofstettler, research group leader; and others. The tapes were shown during the two weeks of the promotion over television station WSAZ's daytime Katie Doonan Show, which has a large audience of housewives in West Virginia's Kanawha Valley.

In addition, there were other radio and TV interviews, 136 one-minute commercials, and a series of full-page local newspaper ads.

Marketing Problems: Behind Carbide's program are two major-marketing problems:

(1) The firm is faced with a highly competitive situation in the sales of components for polyether foams. Carbide (along with others—e.g., Dow, Wyandotte and Jefferson Chemical) sells all the components, except toluene diisocyanate (TDI is made by Du Pont, Mobay and Allied Chemical Corp.'s National Aniline Division). Further competing with the 30 or so polyether foam makers are producers of other cushioning, padding and insulating materials such as foam rubber, vinyl foam and innersprings.

(2) Polyether foam makers have a name-registration problem. This lack of identification, in fact, appears to be the one flaw in Carbide's secondary marketing plan.

At present, a few companies, including Carbide, are trying to gain recognition for the name polyether foam. But so far, industry-wide efforts to agree on a name have failed. Thus, Carbide's program, ignoring the name urethane and focusing instead on polyether, is a calculated risk aimed at consumer education—always a slippery path to follow in product promotion.

Growth Market: Since the polyether breakthrough of some five years ago, use and production of the foam has grown rapidly. In '57 some 8 million lbs./year of polyether foam were sold. This year, the market is estimated, optimistically, at 100 million lbs., based on the foam's use by over 300 furniture makers and by automobile, boat and clothing manufacturers. Polyether foam capacity probably is slightly in excess of demand.

It's still too early to measure the over-all effect of Carbide's secondary marketing efforts. It is apparent, however, that an increasing number of CPI concerns are turning to secondary marketing techniques in an effort to gain name registration, support the marketing efforts of their customers. The tightening competitive situation will likely make such techniques all the more necessary.

Defense Buying Shifts

The chemical-buying patterns of the U.S. Defense Dept. are undergoing marked changes. Shifts in chemical purchasing habits by the nation's largest single customer spells new sales opportunities for many chemical process industries companies, declining business for others. In either event, CPI sales managers are keeping an eye on the Pentagon's chemical plans in order to reap maximum benefits.

Main reason for changing defense purchases of chemical and allied products is the Defense Dept.'s continuing standardization program. Chief goals: reduced defense expenditures for similar or duplicate chemical products, greater flexibility and interchangeability of items, stepped-up performance standards.

And, the current emphasis on chemical, biological and radiological warfare methods serves to focus added attention on how and what chemical products the government will buy.

What's Affected: Principal chemical products affected so far by the standardization program are industrial solvents, ion exchange resins, desiccants, chemical specialties, glazing compounds.

How it works: First step in the standardization program of the U.S. Army Chemical Corps — one of the biggest Defense Dept. buyers of chemicals — is the gathering of pertinent property and application data on chemical materials currently purchased, determining what grades and package sizes are commonly needed by the Armed Forces. Items found to be unnecessary are eliminated.

One index of the growth of this program is the burgeoning of civilian staffs needed to handle all the specialized facets of the job. One contract engineering company, Philadelphia-based M & T Co. tells CHEMICAL WEEK that it had two people assigned to this task in '57, now has 15 people working on some 40 projects.

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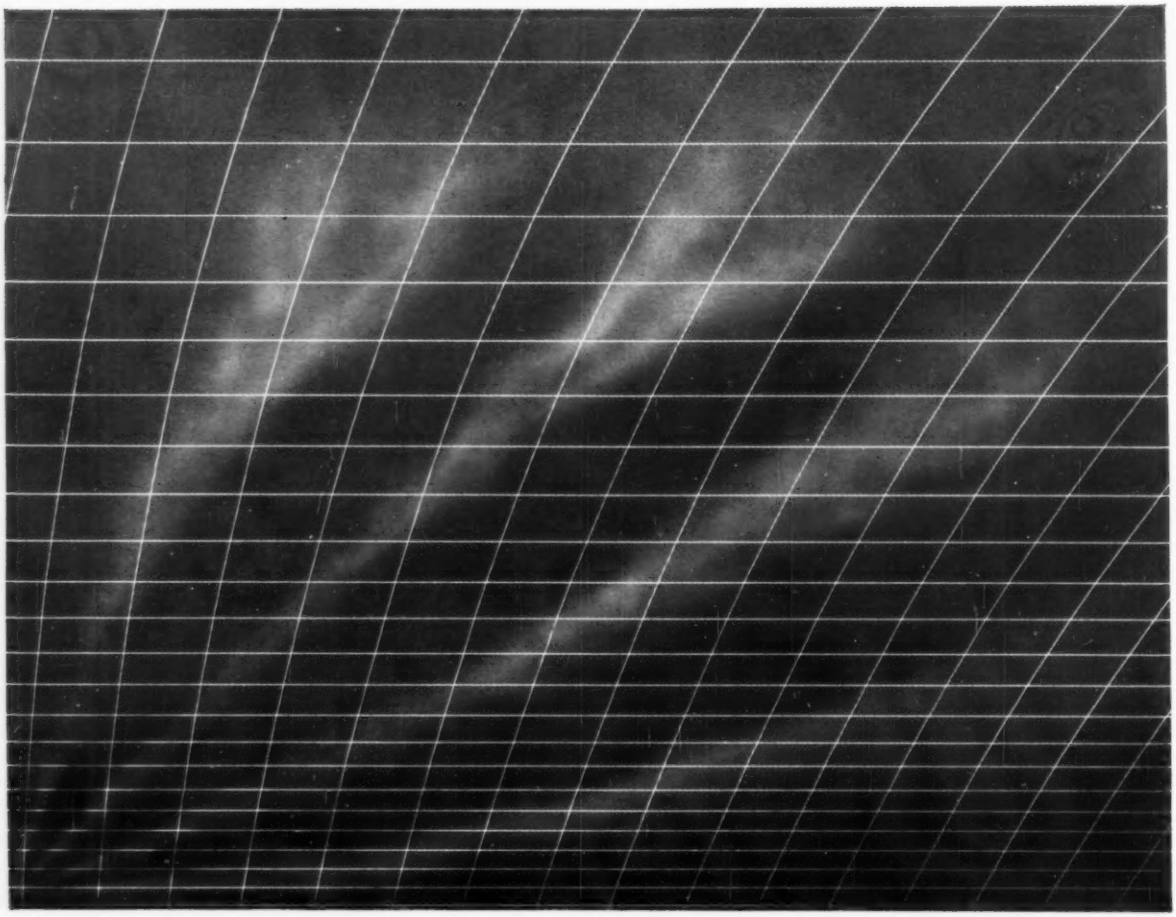

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Technology
Newsletter

CHEMICAL WEEK
May 14, 1960

Two new grades of dimer acid are being commercially produced by Emery Industries, Inc. (Cincinnati.) Empol 1024, for urethane foams, has low monobasic acid content (1% maximum). Empol 1014, said to be the first pure dimer acid offered commercially, permits the formation of long polymer chains with little cross-linking. Because of its high purity, more dimer acid can be used in alkyd resins without gelling, resulting in improved toughness, greater flexibility.

•

Add Du Pont to the growing list of auto-exhaust catalyst developers. First reports last week were that Du Pont and Studebaker-Packard Corp. had jointly developed the antismog filter, which would be in production by this fall for some '61 car lines. But Du Pont says its catalyst is a joint research effort of its Industrial and Biochemical Dept. (Belle Works, W.Va.) and the petroleum chemicals division of the Organic Chemicals Dept. (Deepwater Point, N.J.)

After early tests showed the catalyst offered promise, it was turned over to the Automobile Manufacturers Assn., which coordinates research in the auto-exhaust field. AMA farmed out the catalyst to Studebaker-Packard for further testing. Du Pont is now researching exhaust devices that can use the catalyst.

•

A new way to pipe liquid nitrogen—without insulating the tubing —was revealed last week by The Garrett Corp.'s AiResearch Manufacturing Division of Los Angeles. The technique permits liquid nitrogen to be moved through flexible plastic lines to cool infrared detectors and other electronic equipment; transmission distances up to 25 ft. are possible.

AiResearch didn't discuss details of the technique, on which it has patents pending. But the idea is believed to be similar to the pulse method used by Union Carbide's Linde Co. Slugs of liquid nitrogen are admitted to the transfer line using a timing or pressure-relief valve. As the droplets of nitrogen bounce down the line, some vapor is formed; the vapor acts as insulation for the line. In addition to Linde, which has three other cryogenic cooling systems available, Arthur D. Little, Inc., Perkin-Elmer Corp. and Air Products Inc. are among those offering cryogenic cooling systems. And Battelle Memorial Institute recently embarked on a program to evaluate both established and experimental cooling systems for electronic equipment (*CW Technology Newsletter, April 23*).

•

A new series of inorganic glass compositions, some liquid at room temperatures, are looking for uses at Bell Telephone Laboratories (New York). Composed of varying proportions of arsenic, sulfur and bromine, they are relatively stable toward acids, are attacked by alkalis, tend to hydrolize in water. Feature: indexes of refraction range between 1.9 and 2, relatively high for glasses.

A new coating material featuring improved protective properties is now available to paper and paperboard coaters. National Starch and Chemical Corp. is offering the material—a polyvinylidene chloride latex—under the name Resyn 3600, will produce the resin at its Meredosia, Ill., plant. Coatings made from the new resin can be applied by high-speed coating equipment, are said to provide paper and paperboard containers with extremely high resistance to moisture vapor transmission and to have good chemical inertness and good oil and grease holdout. National says the new coating system is competitive in cost with polyethylene extrusions or laminations.

•

Lining corroded pipelines may be an important use for Strubing, Wolverine Tube's new lightwall seamless tubing. It's shipped in flat, ribbon form and inflated at point of use (*CW, July 25, '59, p. 104*).

Wolverine will field test the idea this week at a major chemical company. Nickel-alloy Strubing will be drawn through a 300-ft. length of corroded caustic pipeline, then inflated to form the lining. Among the questions the test may answer: how long a section of pipe can be lined with a single length of Strubing; whether metal projections at welded joints of the pipeline or in badly corroded areas will mar or puncture the new tubing.

The idea of lining pipelines with more expensive, corrosion-resistant alloy tubing isn't new. But most of the work has been done with new pipe in a shop. For example, Gray Tool Co. (Houston) has been experimentally lining oil field piping with alloy tubing for about five years, has recently shifted to chemical plant pipelines. One problem still not completely solved: lining of elbows.

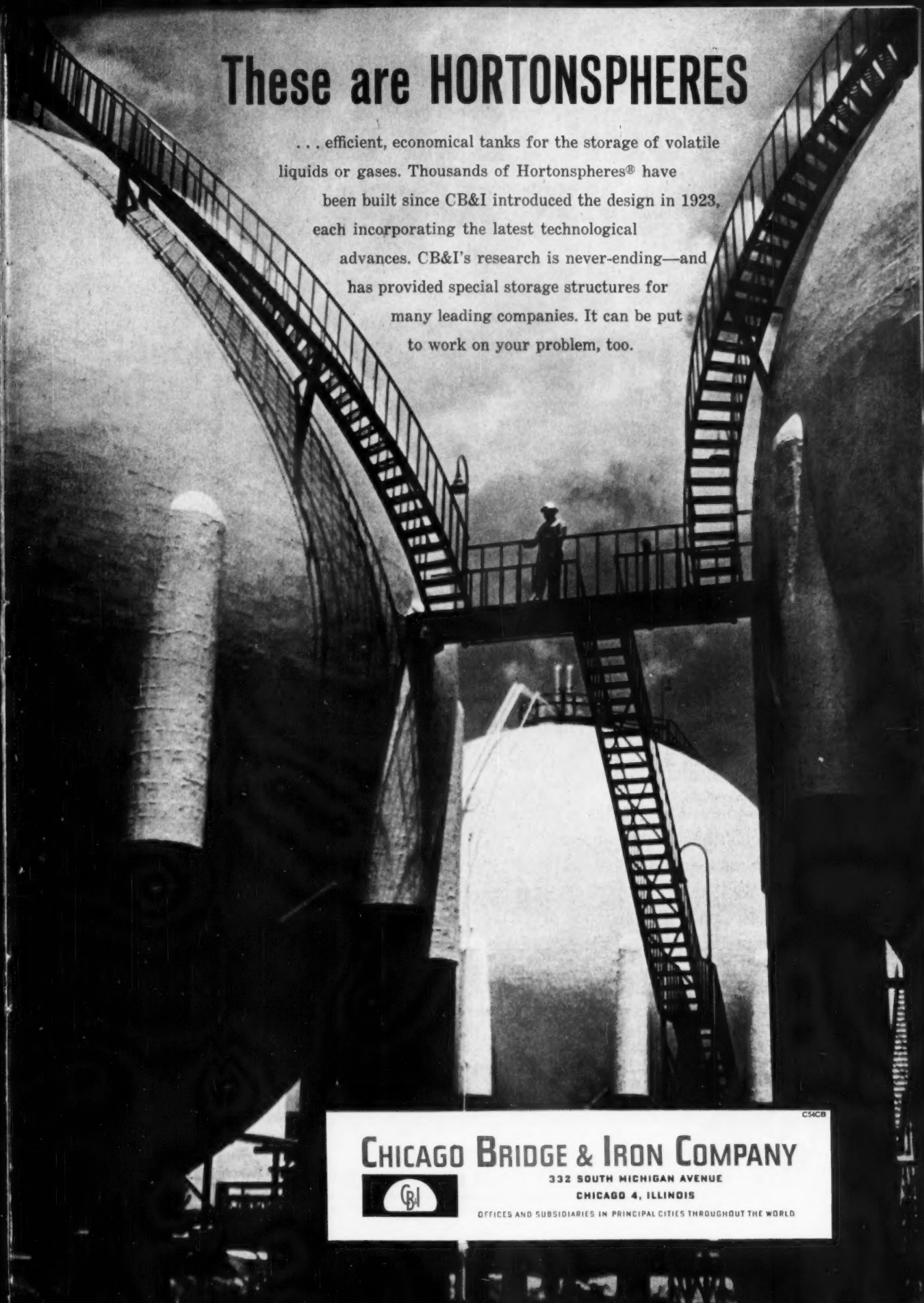
•

Water-based linseed oil paint is quietly getting a tryout by several major paintmakers using undisclosed formulations. The paint is for exterior use, reportedly adheres well to chalky surfaces. After exposure, it chalks to renew its surface, remains fresh looking. The research to find suitable linseed oil-water emulsion vehicles is centered at the U.S. Dept. of Agriculture's laboratory at Peoria, Ill., where work on the project is being done at the request of The National Flaxseed Processors Assn.

According to Howard Teeter, who heads oil products investigations at the oilseed crops lab., USDA is using commercially polymerized linseed oil with all three types of commercially available emulsifiers (cationic, anionic and nonionic). Yellowing and mildew inhibition are still problems. However, yellowing is less of a problem with exterior paints, which tend to bleach during use. Zinc oxide, currently used to inhibit mildew, doesn't emulsify satisfactorily.

•

A new drug to fight pinworm—said to infect 20% of the U.S. population—scored better than 95% cures in clinical trials supervised by the Clinical Investigation Dept. of Parke, Davis (Detroit). One dose of the oral drug, pyrvinium pamoate (Parke, Davis's Povan), reportedly offers an effective cure within one week after it's administered.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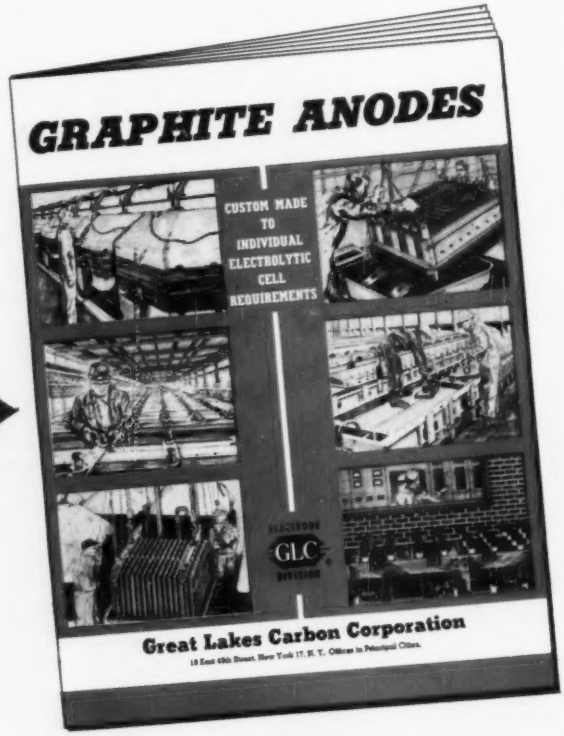

Everyone connected with electrolytic cell operations should have a copy of our new brochure GRAPHITE ANODES. It contains a wealth of useful information.

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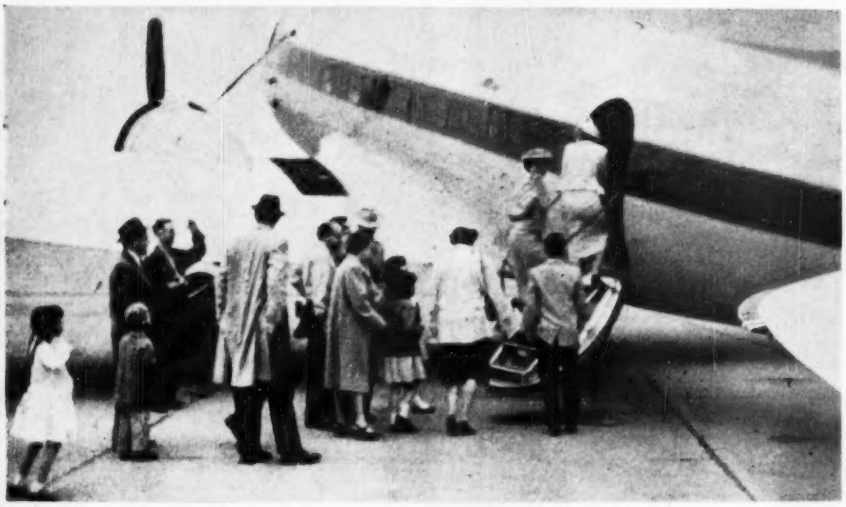
Researchers' families board plane at Pittsburgh.



Next stop, Carbide's new labs at Tarrytown, N.Y.

Smoothing the Lab Shift

This week in formally opening its Tarrytown, N.Y., labs, Union Carbide Chemicals Co. marks the successful outcome of a challenging personnel-management job: transferring about 50 individualistic research specialists from four locations to a single spot, and melding them into a cohesive laboratory team. But UCC is quick to admit that, besides foresight, corporate policy, care, personal touches and generosity, it takes a measure of luck to pull off this kind of a move.

The problems are many: there is the job of picking the staffers, persuading them to make the move, keeping projects going, settling the transferees in the new site. In UCC's case—which typifies both solutions and problems—matters were complicated by an uncertainty about the lab's completion date.

Four to One: The company's transferees were drawn from Pittsburgh, Pa., Tonawanda, N.Y., South Charleston, W. Va., and Washington, D.C.

Under a plan worked out by Robert Simpson, personnel manager of Carbide Chemicals' marketing division, and Edward Weidlein, assistant director of the firm's labs in Pittsburgh's Mellon Institute (35 came from Pittsburgh), they were moved to Tarrytown. This lab centralizes studies (for technical and customer services) in detergents, urethanes and antifreeze.

Supervisors were given the double job of choosing those to be transferred—and juggling projects to keep them busy until transfer time. Simpson took on the job (during special night meetings in late '58) of explaining the objective of the move to staffers and their wives, outlining real estate prices and other information about the Tarrytown area.

Then, in April '59, the company treated the wives to a company plane trip to the new site, chartered a bus to show them the area. A real estate agent went along to point out houses for sale (most are in the $22-24,000 bracket). But the company steered clear of specific recommendations, supplied only lists of real estate agents and legal counsel in the area.

Homes on Hand: Carbide's policy is to help transferees dispose of their homes; it buys them at current value or the expected value within a reasonable period of time. This worked out well for those in areas where housing values have not declined (e.g., Pittsburgh), but it was not as helpful to those with homes in a depressed area (Tonawanda). Also helping ease relocation, Carbide offered to grant loans of $2-3,000.

Despite the range in service and job status of the transferees, Carbide treated all employees equally, with minor exceptions. For example, families having children in senior year at high school were permitted to defer their moves until September. No salary adjustments were made strictly on the basis of the change, although exceptions were made if the transfer also brought increased job responsibility.

Liberality Is No Insurance: But while Carbide feels that its move was a success, some companies with equally liberal policies have struck

Carbide Chemicals' Simpson (left)

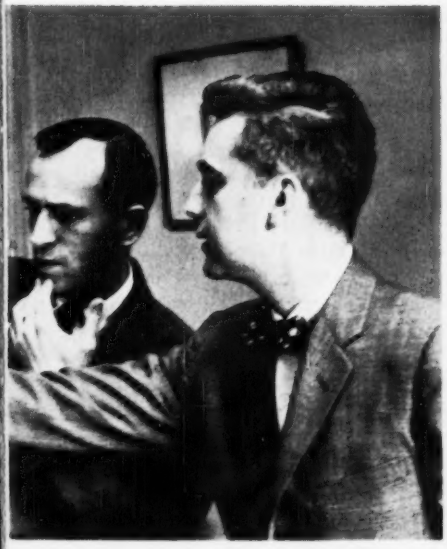
snags. Minnesota Mining and Manufacturing's experience is one example. After 3M acquired several small companies in the New York area recently, it decided to transfer the operations to St. Paul.

Seeking to persuade key technical men in the acquired firms to move, 3M held dinner meetings for them in New York, explained the company's policies and (with the help of movies) the advantages of living in the Minneapolis-St. Paul area. Then 3M flew some of the men out to visit the community. But despite this effort, not many key people decided to make the move.

Detailing future working and living conditions is characteristic of most big companies' policies on transfers. The policy of also giving wives of transferees a preview of prospective new areas is standard for American Oil Co. (Texas City, Tex.), Celanese Corp., Monsanto and Spencer.

Assistance given in actually moving varies, however. For example, if a net loss is incurred in a Spencer employee's sale of his house, the company assists in paying selling and closing costs. But this is only in cases in which the employee has lived in the house for less than five years from the date of employment or his last transfer. The amount of expenses the company will pay decreases with the amount of time he has lived in the house.

One Southwest firm—reluctant to



and Weidlein handle moving details.

be identified because its policies may vary from those of its parent companies—will, without charge, advance an employee the amount of money invested in a house (up to $25,000) until it is sold. The advance must then be repaid. The company will also pay the realty fee that a seller has incurred.

Moving expenses are usually interpreted liberally. American Oil includes expenses for moving animals, such as dogs. Jefferson Chemical will pay for the cost of moving a boat.

Details, Details: Moving into a new lab can involve more than personnel problems, of course. For instance, Parke, Davis & Co.'s recent move from its main laboratories in Detroit to its new, $13.5-million research facilities in Ann Arbor, Mich., was spread over five months.

Thirty moving vans were used to transfer about 200 tons of equipment of 300 researchers, including 7,000 separate pieces or cartons from 113 laboratories, office areas and a library, and furnishings from 24 rooms containing more than 4,000 animals. The library consisted of 15,000 bound volumes that weighed an estimated 20 tons.

Moves of this magnitude aren't frequently encountered. But large or small, each demands more than broad policy—it also requires close attention to the needs of individuals—if the move is going to be a happy one for all concerned.

Fast Data for Goodyear

Goodyear Tire and Rubber Co. is joining the growing list of companies that have set up their own automatically operated centers for the retrieval of research and development information (*CW, Feb. 20, p. 75*).

Using a system developed by research librarian Leora Straka, Goodyear plans to include references to over 500 technical journals, plus books, reports and other publications. Eventually, the company will include all its own internally generated R&D reports.

IBM punch cards form the heart of the new system. A literature chemist decides what is significant in the article, then codes the cards with up to 25 key terms drawn from a dictionary of more than 100,000 terms.

A new dial board panel, developed by Miss Straka and F. K. Dietzler of the company's development staff, allows a user of the system to simply dial the codes corresponding to the type of information he wants. The cards are delivered automatically. No more than one "false drop" (unwanted card) in 10,000 is expected from the new system.

EXPANSION

• Parke, Davis & Co. has dedicated its new, $13.5-million laboratories (*see p. 105*) at Ann Arbor, Mich. Already in full operation, the new buildings contain 250,000 sq. ft. of floor space, more than doubling the company's research area.

• Visco Products Co., division of Nalco Chemical Co., is starting construction of a new, $750,000 office-laboratory building at its present plant site in Sugar Land, Tex.

• Nearly 10,000 sq. ft. will be added to the research center of American Can Co.'s Canco Division at Barrington, Ill.

• An industrial atomic energy research center is being planned for the Cape Cod area of Massachusetts. The center would be privately financed under lease contracts with nuclear research and public utility firms.

• Western Kraft Corp. has completed a container and pulp-paper development laboratory at its mill in Albany, Ore.

• Food Machinery and Chemical Corp. will begin construction this

summer of the first phase of a new research and engineering center. The 40,000-sq. ft. initial phase will be located in Santa Clara, Calif., adjacent to the San Jose facilities of the company's central engineering laboratories.

• Borden Chemical Co. is adding a product development laboratory to its Springfield, Ore., plant.

• Rayonier Inc., chemical cellulose producer, will spend $400,000 for a 10,000-sq.ft. addition to its Whippany, N.J., research center.

• Construction of a $50,000 research facility at Continental Oil Co.'s Ponca City, Okla., plant is under way. The new unit is for evaluating plasticizers and other products used in plastics.

• A new food research building has been dedicated at Cornell University's New York State Agricultural Experiment Station at Geneva, N.Y. (Annual budget of the station is $1.5 million.) Included are chemical, radiation, and bacteriological laboratories; equipment for studies on evaporating, filtering, drum drying, clarifying, flash freezing, essence recovery, dehydration, centrifuging, and spray drying.

PRODUCTS

Itch Easer: A new parenteral steroid for use in veterinary medicine to relieve dermatoses, arthritides and related disorders is offered by E. R. Squibb & Sons under the tradename Vetalog. It is an aqueous suspension of triamcinolone acetonide.

•

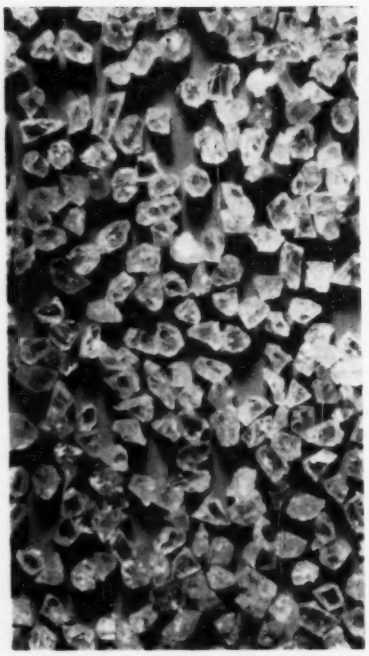
New Foils: Titanium tritide foils are newly available from United States Radium Corp. (Morristown, N.J.) for use as ionization sources, beta supplies for nuclear batteries, beam targets in neutron generators, and in gas chromatography.

•

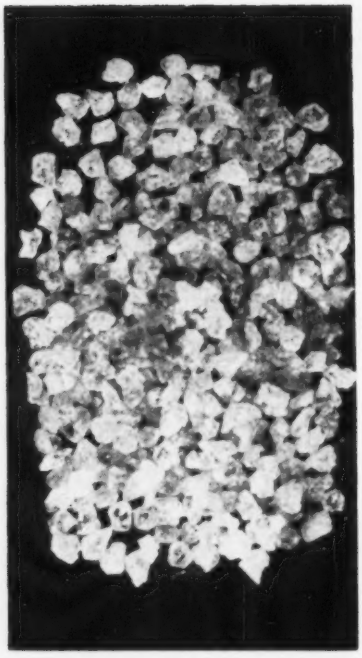
Indium Entry: For forming alloy junctions in germanium transistors and diodes, 99.9995%-pure indium spheres are now being produced by Accurate Specialties, Inc. (37-11 57th St., Woodside 77, N.Y.).

•

Diamond Maker: Norton Co. (Worcester, Mass.) has made synthetic diamonds experimentally, applied for patents on its method. It has no plans for commercial production.



NEW NATURAL DIAMONDS are 'bulky,' boost cutting speeds 50%.



GE's SYNTHETIC DIAMONDS, also bulky, are tailored to compete.

Diamonds Clash Over Cutting Jobs

The battle for industrial diamond markets waxes hotter. To counter the threat from synthetic diamonds, De Beers Consolidated Mines (Johannesburg, S. Africa) is this week offering experimental quantities of selected natural diamond particles for metal-bonded cutting wheels.

The selection process—which De Beers says it will share with "anyone else seriously in the business"—screens out thin, weak particles, leaves "chunky" ones, which have better resistance to abrasion and are held more firmly in metal-bonded matrices. Use of the new particles increases diamond saw and wheel cutting rates 50%, the firm claims.

Meanwhile General Electric's Metallurgical Products Dept. (Detroit) has trotted out a new grade of synthetic diamond for metal-bonded wheels that also eliminates jagged and irregular particles.

GE claims that the new product is a different type of diamond crystal than has been previously offered—that its diamond-making process can be tailored to turn out any kind of industrial diamond required. The new particles are blocky-shaped single crystals ranging in color from light green to dark grays and black.

And, at the recent American Society of Tool and Manufacturing Engineers tool show in Detroit, the Industrial Diamond Division of Engelhard Hanovia, Inc., disclosed a reverse twist on this diamond trend. The division's newly commercial "SND" (for selected natural diamond) consists of predominantly needle-like or thin, flat plates instead of De Beers' blocky particle shapes. (De Beers also supplies Hanovia's diamonds.)

The new Hanovia diamonds are said to be at least 30% more efficient than conventional diamond grit for certain operations in the grinding of cemented carbides. They were developed for use in resin-bonded grinding wheels, and are made by special techniques for crushing bort (material consisting of imperfectly crystallized or coarse diamonds) at Hanovia's Newark, N.J., plant.

Because of their shape, SND particles are said to be held more firmly in the resin bond than are conventional particles. They also break down gradually and evenly, provide more cutting edges per carat—according to Hanovia—than conventional diamonds.

New POLYOX water-soluble resins give toiletries that creamy-smooth feel

POLYOX resins add a pleasing lubricity to facial and hand creams . . . brushless shaving creams . . . lotions and other toiletries. In toothpastes, they give a desirable "mouth feel."

You can choose from a wide range of viscosities with POLYOX resins. In three grades, they have molecular weights ranging from several hundred thousand to over six million. Truckload quantities of POLYOX resins are available *now*—as are samples for laboratory projects and evaluation.

A Technical Representative in the CARBIDE office nearest you can give you more information on POLYOX resins. He can suggest starting formulations, and supply price and shipping information. For a new technical bulletin listing grades, properties, and numerous applications, write Dept. H, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y.

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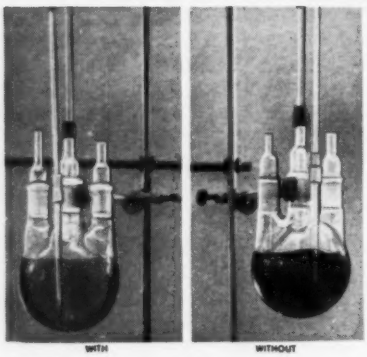
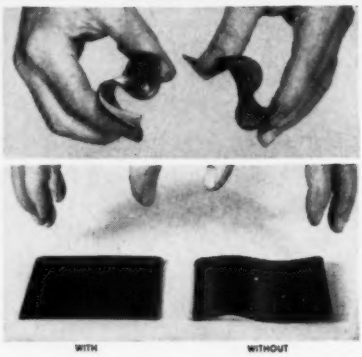
Monsanto Task Force Chemicals...



Toluenesulfonic Acid

STRONG ACID CATALYST GIVES "CLEAN," EASILY CONTROLLED ESTERIFICATION REACTIONS WITH HIGH YIELDS

Organic reactions requiring a strong acid catalyst use TSA to produce higher yields with fewer side reactions. TSA virtually eliminates the charring and degradation products caused by oxidizing mineral acid catalysts such as sulfuric. Monsanto TSA has an exceptionally high purity and is the lightest in color of any produced commercially—has proved outstanding for making phenol formaldehyde and alkyd resins. It can also serve in the production of phthalate esters, epoxy resin varnishes, monoglycerides, polyvinyl acetate and similar esterifications. For example, nitrile esterifications (actually a two-step process involving alcoholysis) proceed more cleanly with higher yields and produce esters of better quality when catalyzed by TSA. Examples of the improved technique are reported in the *Journal of Organic Chemistry*, *23*, 1225 (1958).



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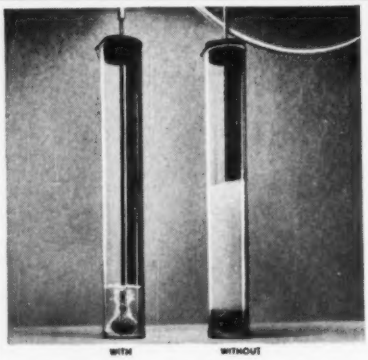
In most butyl compounds a small amount of ELASTOPAR will boost resilience, vastly increase modulus, raise abrasion resistance, improve low-temperature flexibility, greatly increase electrical resistivity, reduce cold-flow of uncured stocks and lower Mooney viscosity. In rubber products subject to rapid flexing (such as vibration dampening motor mounts) butyl with ELASTOPAR shows much less heat build-up. Yet ELASTOPAR does not change hardness, affect cure or increase the normal time or temperatures of mixing. It eliminates the need for special heat treatment of the stock, making butyl products lower cost than ever. Now manufacturers can take full advantage of butyl's superior impermeability to gases, electrical properties, low initial cost, tear strength, and resistance to weather, heat aging, ozone and oxidizing acids.



Defoamer PC-1344

CONTROLS IN-PROCESS FOAMING OF ORGANIC LIQUIDS AND INCREASES REACTOR CAPACITY

A non-metallic complex polymer, PC-1344 eliminates waste space allowed for foaming in the reactor—permits faster through-put and eliminates troubles in processing with many aliphatic or aromatic reactants. It tolerates up to 1.5% water, is increasingly efficient as acidity increases. Concentrations range from a few ppm to 0.50% depending on the process materials. In processing of wax, it eliminates the foaming, controls "bubbles" in wax coatings, promotes better leveling. Wax-coating machine speeds can be increased greatly. In alkyd processing, it controls foaming in the resin kettles and often helps reduce the cook time. PC-1344 is also used in various stages of refining, as an additive in petroleum products, and in the chlorination of hydrocarbons. Coatings manufacturers add a few ppm to the finished product to keep lacquers and varnishes from bubbling when sprayed or brushed.

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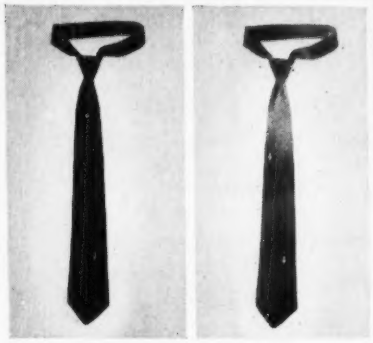
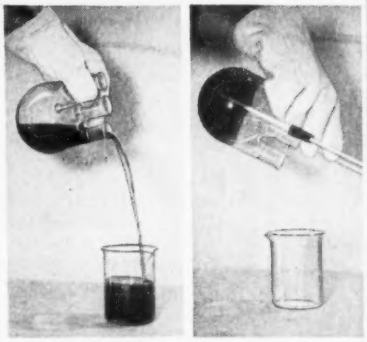


WITH WITHOUT

Biphenyl

SPEEDS UNIFORM DYEING OF POLYESTER FIBERS, YARNS, OR FABRICS

Hard-to-dye polyester fibers take deeper, more level coloring faster when biphenyl is used in the dye bath. The presence of biphenyl increases the diffusion rate of both disperse- and azoic-type dyes. The biphenyl apparently acts as a "carrier" or dyeing accelerator—deep shades and level dyeing can be achieved with dye bath temperatures in the range of 85° C, eliminating the need to run the dye bath in the range of 110°–130° C. Biphenyl appears to step up the rate of dye diffusion into the polyester fiber; the effect is to accelerate the rate of absorption. As little as 6% biphenyl on the dye weight in a 30:1 dye bath promotes this faster dyeing for deep shades and improved leveling. Currently used by a number of major dyers, biphenyl may also prove helpful in promoting the more uniform coloring of polyesters used for making fiber glass building panels and resin-faced concrete blocks.



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Benthal

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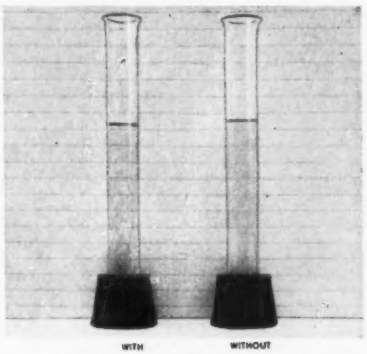
A molecular chain "stopper," BENTHAL modifies the internal cross-linking of reactive dibasic acids and develops a degree of internal plasticizing in the products. In resin cooking, BENTHAL helps you reduce the acid value and complete esterification before excessively high viscosity develops and gelation occurs. As a laboratory example of the effect of BENTHAL: a 33% linseed oil-modified alkyd cooked at 430° F. reaches the gel stage in 49 minutes with an acid number (on the solids) of 60. With 10% of the dibasic acid replaced by BENTHAL, the resin does not gel for 75 minutes of cook time, shows an acid number of 30. BENTHAL serves to reduce the in-process viscosity of straight alkyds, oil-modified alkyds, and polyesters. It also improves their durability, alkali and water resistance, and gloss.



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Triphenyl phosphite, in low concentrations (0.10%–0.30%), retards darkening during cooking of alkyds, unsaturated polyesters for glass laminates, saturated polyesters for urethane foams, or terminated polyesters for "permanent" type plasticizers. In combination with barium soaps and epoxidized compounds, it synergizes the combination to produce an excellent vinyl stabilizer system which, at levels of 0.5–1.0%, gives optimum heat and light stability. Triphenyl phosphite also acts as a metal-scavenger. In processes using calcium, lithium, or manganese catalysts, it chelates small amounts of haze-forming metal to keep the final product clear and cloud-free without filtering. Its newest most provocative use, predicted from established activity with high molecular weight alcohols, is to speed up simple esterifications of less complex, lower alcohols.

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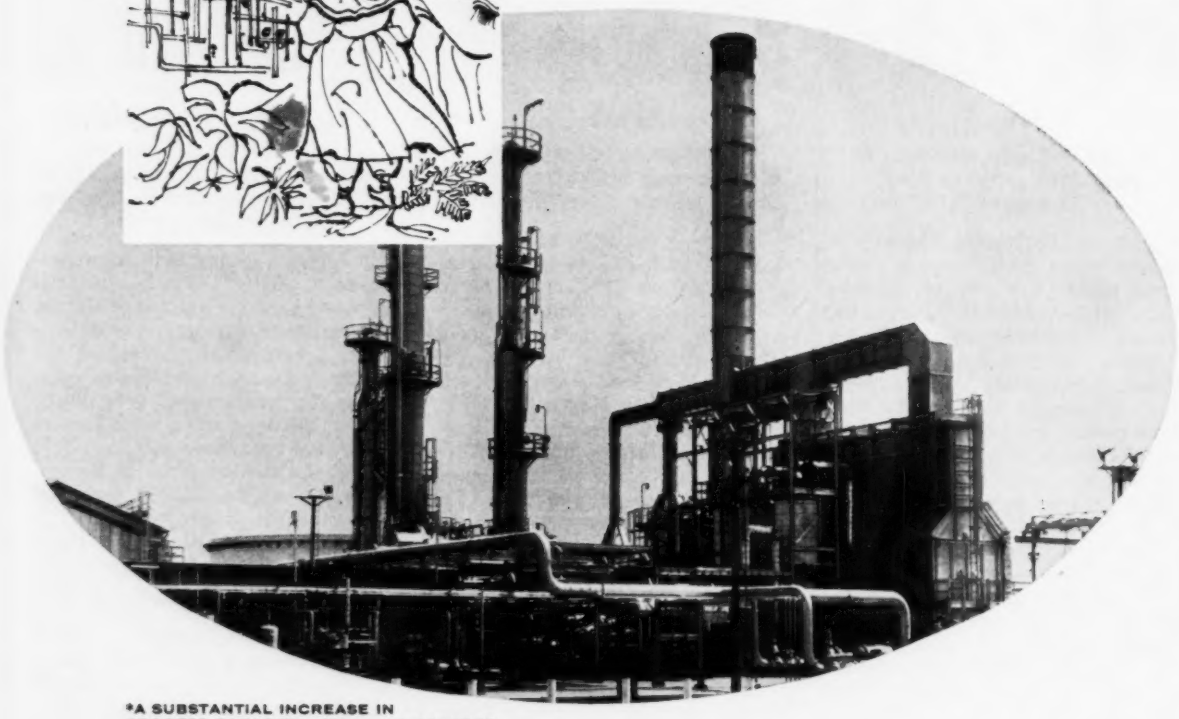

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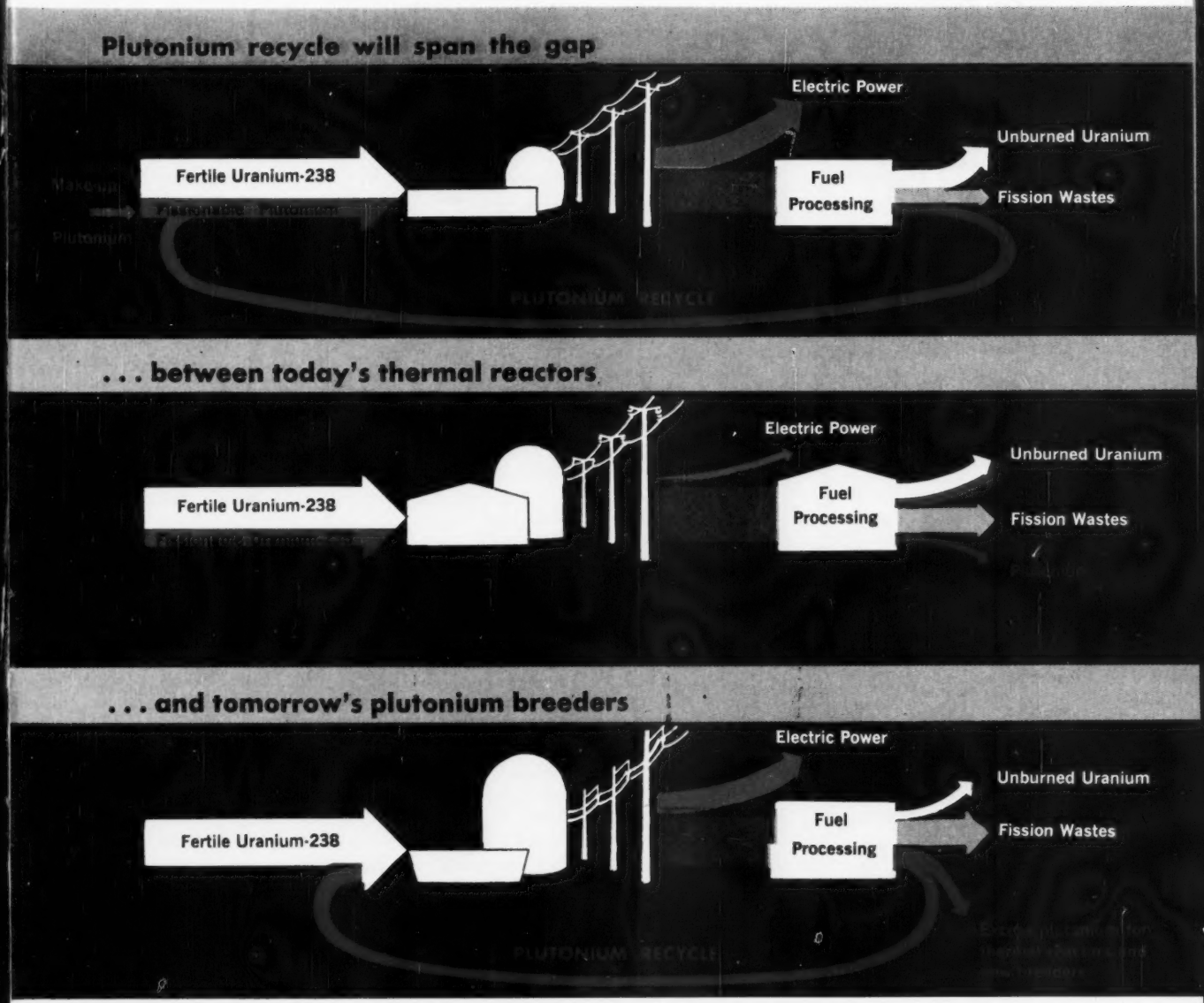


Plutonium: Key to A-Power Preparedness

Although commercial nuclear power generation is still in its infancy the experts are already planning for the time when this robust infant's appetite will exceed available supplies of natural fuel.

At the heart of this long-range preparedness project is the Plutonium Recycle Program (PRP) now being readied for startup this summer at the Atomic Energy Commission's Hanford, Wash., labs (*CW, April 23, p. 74*). Private firms engaged in, or planning, commercial nuclear fuel production will be closely watching the chemical processing portion of PRP.

The outcome of this program will likely set the pattern for the commercial production of plutonium fuels. And it may also affect current fuel processing operations by pointing up desirable modifications needed to permit interchangeable use of conventional enriched-uranium and newer plutonium fuels.

Present plans call for the use of existing Hanford facilities for PRTR fuel processing. However, construction of a fuels-recycle pilot plant (FRPP) has been requested to accommodate chemical processing and disposal of partly decontaminated material.

Initial processing is scheduled for late next year, after the initial 36 plutonium-aluminum alloys elements have been irradiated to about 50% burnout. The work will be done in

the Redox plant at the Hanford site.

Plutonium recovery will begin with the selective dissolution of the Zircaloy-2 fuel cladding in ammonium fluoride and ammonium nitrate. The core material will then be dissolved in nitric acid and passed through the Redox hexone solvent extraction cycle. The decontaminated plutonium nitrate product will subsequently be converted into a suitable form for refabrication into fuel elements.

Basing expectations on lab studies of anion exchange for the recovery of highly purified and decontaminated plutonium, GE researchers look for no complications. Results indicate that (1) plutonium can be completely decontaminated by two cycles of anion exchange, incorporating fluoride washing; (2) Permutit SK resin (20-50 mesh) is satisfactory for material receiving radiation dosages up to $4\text{-}10^8$ roentgens; (3) a sparation factor of 10^6 can be obtained in a single anion-exchange cycle when the ratio of uranium to plutonium in the feed is 300 to 1.

A pyrochemical technique — the salt-cycle process — is also believed to hold considerable promise for PRP processing. This method involves dissolving uranium oxide in molten potassium-sodium chloride eutectic under the influence of chlorine or phosgene gas to produce uranyl chloride. Plutonium content may then be separated by filtration or other phase separation techniques. Zinc reduction or electrolytic processing converts the uranyl chloride in the molten salt into reusable uranium dioxide.

Entire Package: The goal of PRP is the development, demonstration and optimization of the technology and economics of using plutonium fuels in thermal heterogeneous power reactors. These are the reactors that consume fissionable uranium-235 and which are expected to be most widely used for commercial power generation in the next few decades. In contrast, breeder reactors, which produce more fissionable material than they consume, are expected to become the dominant type during the next century.

The primary incentives for plutonium recycle depend on the economics of fissionable fuels supply and demand. In the face of the present abundance of enriched uranium and the relatively small requirements of existing and planned power reactors, the incentive is limited by the comparative costs of plutonium recycle vs. other types of fuel cycles. But the foreseeable need for ever-increasing quantities of nuclear-derived energy (*see CW Report, p. 63*) lends added weight to the plutonium side of the economic scale.

For one thing, plutonium recycle permits recovery of up to four times the energy currently being realized from a given quantity of uranium. When only uranium-235 is "burned," only $3.6\text{x}10^{11}$ Btu. of the total available in a ton of natural uranium oxide ($5.9\text{x}10^{13}$) can be utilized. In a recent report on breeder reactors (*Nucleonics, February, p. 60*), William Ergen of Oak Ridge National Laboratory estimated that at least 20% of the nonfissionable uranium-238 must be burned if the uranium recoverable at today's prices is to contribute as much energy as U.S. fossil fuel reserves.

A further consideration of plutonium recycle is its shorter-range impact on fuel-cycle costs of thermal reactors. The ability to use plutonium as an alternate for enriched uranium would reduce dependence on the costly gaseous diffusion process required for separation of uranium isotopes. And because all uranium-burning reactors produce plutonium, together with other gross-fission products, the upgrading of this by-product to fuel status could enhance the economic attractiveness of reactor concepts in which the net cost of power is affected by plutonium credit.

Divide and Conquer: To solve the many diverse, but interrelated, problems of plutonium recycle, the Hanford Atomic Products Operation (operated for AEC by General Electric Co.) has divided the project into a number of subprograms. This will bring into play many existing Hanford facilities, plus several new ones designed specifically to meet PRP needs. Some highlights of the subprograms:

- Fuel-cycle analysis — utilizing specially developed programing codes for computer studies of such factors as fuel costs and plutonium values based on inventory, burnup, composition and fabrication cost.
- Recycle physics — exploring the data needed to predict the behavior of plutonium-bearing fuels in

light-water, heavy-water, organic-liquid and graphite-moderated systems.

• Plutonium fuels development—concentrating on the processing of fuel materials and on fuel element fabrication. A key facility for this subprogram is the plutonium fabrication pilot plant that went into operation last July. It features a wide variety of equipment specially designed for handling toxic materials.

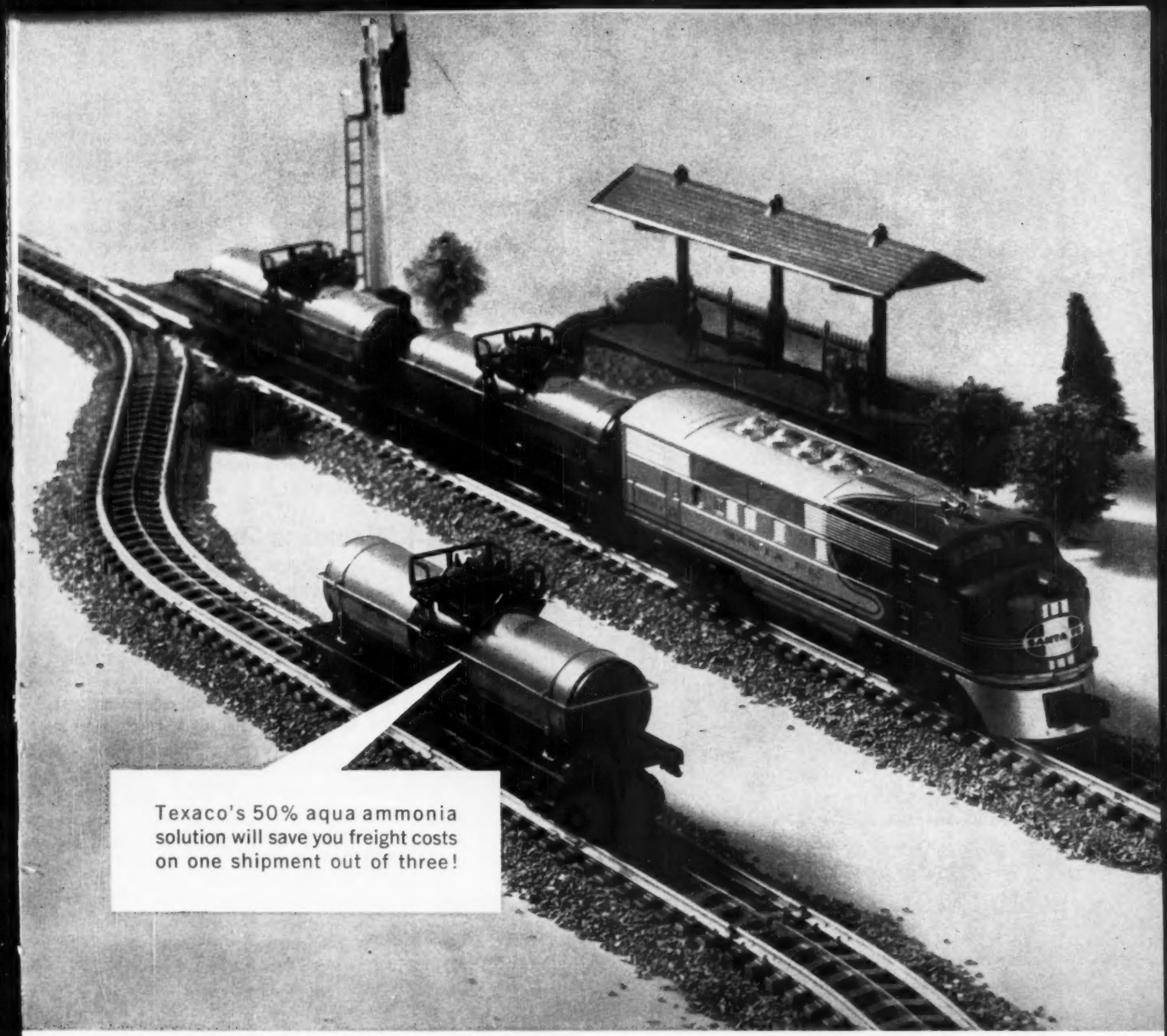
• Uranium fuels development — studying the technology and operational limits of ceramic fuels (primarily, but not exclusively, uranium dioxide types) with an eye to designs and processes that can be translated to plutonium fuels development.

• The plutonium recycle test reactor (PRTR) will be used for irradiation testing of fuel, production of pilot-plant quantities of material for reprocessing and fabrication and to provide data vital to economic and engineering studies. Essentially, it's a 70-megawatt (thermal), pressurized-tube reactor using heavy water as moderator, reflector and primary coolant. Steam produced by secondary heat exchange with light water will be condensed and wasted to the Columbia River.

Spanning the Gap: Chances are that plutonium recycle will be an important technique during the inevitable transition from thermal power reactors to breeding types of the future. For one thing, it will assure a continuing supply of fissionable fuel for thermal systems that are still economically operable when low-cost uranium-235 become scarce. Without such assurance, future generations of thermal reactors might face serious economic limitations — such as dependence on high-cost uranium from marginal reserves or shortened depreciation periods due to lack of a fissionable fuel.

Plutonium recycle reactors may also contribute to the development of the breeder systems on which they must eventually rely for fuel. Computer studies at Hanford indicate that a 40% reduction in doubling time (the time required for a breeder to produce an excess of fissionable material equal to its own requirements) may be possible for a plutonium fast breeder coupled to a high-conversion thermal reactor.

How Much, How Soon? Atomic experts disagree on just how soon



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fuel breeding will become an economic necessity. Reason: as in the case of fossil fuels, continuing exploration is uncovering new reserves faster than the old ones are being depleted. However, the steady annual increase in energy requirements is fair warning that reserves will reach a peak and start to decline in the still distant — but foreseeable — future.

Allowing for the time-consuming job of developing and demonstrating a new reactor concept, the experts agree there's no time like the present to start solving the problems of tomorrow's reactors and fuel-processing technology.

Wringing Out Gasoline

One of the petroleum industry's latest innovations, gasoline recovery from natural gas by dry-bed adsorption, is moving into large-scale operation at Grand Cheniere, La. CATC (an organization formed by Cities Service, Atlantic Refining, Tidewater Oil, and Continental Oil) is currently recovering 1,000 bbls./day of gasoline and liquefied petroleum gas (LPG) from 175 million cu.ft. of off-shore natural gas.

This new unit is the logical outgrowth of a recent trend in natural gas production: producers' use of regenerative desiccant dryers to recover trace amounts of gasoline from their gas streams. Originally, these dryers were used on the tail-ends of processing units to guarantee the bone-dry product gas. Normally, they consist of two tanks used alternately for adsorbing liquids — during off-stream time, the unit is regenerated with heat from low-pressure steam coils. They were usually designed and sold as completely automatic, package units.

Then, natural gas producers found that by decreasing the regeneration cycle from 8-12 hours to 15-30 minutes they could use the package dryers to recover gasoline from their natural gas streams. Since the units were simple and automatic, they could be installed at the gas compression stations and handled by the compressor operators. The liquid products recovered from these units generally were stabilized in a self-refluxing distillation tower that needed no operating control.

The use and economic limits of

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Olin Mathieson is now offering propylene products from extensive new facilities being completed at the Doe Run plant in Kentucky. Propylene Oxide—starting point for the manufacture of propylene glycol and other derivatives. Propylene Glycol—with proved applications in the manufacture of cellophane, for keeping tobacco moist, in food, beverages, drugs, polyester resins, cosmetics and plasticizers. Polypropylene Glycols—used to make foams for crash pads, for garments, refrigeration insulation and to strengthen construction between sheets of aluminum in air frames.

For complete information on the new Olin Mathieson propylene polyols—or helpful technical assistance, write to Olin Mathieson. 7284

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these simple units were described last month in two papers presented at the Natural Gasoline Assn. of America conference in Houston. H. Halff (Texaco, Inc.) explained how his company used them to recover 35-150 bbls./day of 12-lb. vapor-pressure gasoline from gases with a gasoline content of 0.4 gal./1,000 cu.ft. or less. E. O. Patterson, Jr. (Pan American Petroleum Corp.), said a dry desiccant unit recovered liquid product worth $2.84/bbl., at a cost of 39¢/bbl., from a gas stream containing 0.137 gal./-1,000 cu.ft.

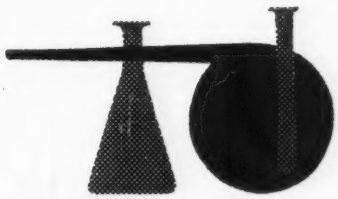
The new CATC unit's approach to the technique is more complicated. Employing eight 20-ft. adsorption towers, it separates two liquid products. First, four towers containing silica-gel recover the gasoline from the gases, then the last four towers adsorb LPG with activated carbon. Products are about 400 bbls./day of gasoline, and 600 bbls. LPG. An added twist: in this unit's regeneration system, hot gases are used instead of the usual low-pressure steam coils.

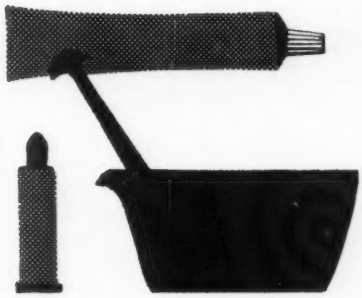
Although the dry desiccant adsorption technique is already three years old, it still has ample room for growth. A CHEMICAL WEEK survey shows that about 100 dry desiccant units are now in operation in eastern Texas and along the Gulf Coast. Yet, despite the large number of units, oil industry experts estimate that only one-third of the country's natural gas is currently being treated, and that about 10 billion cu.ft./day remain to be processed. This represents a vast source of valuable petroleum products for which the unit at Grand Cheniere is a pioneer prospector.

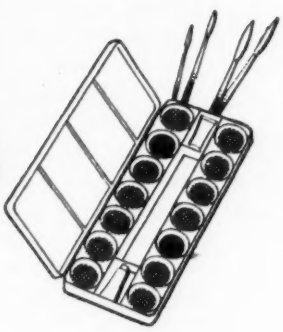
Solids Sampling

Sturtevant Mill Co. (Boston) has developed a continuous sampling system said to avoid the usual problems of bulk-sampling solids. Part of an in-sequence conveyor-fed rotary crusher, the sampler takes 5% of a total flow of ¼ in. lumps and feeds them into a crusher, which grinds them to 8 mesh. Then a second sampler selects 5% of the 8-mesh material and returns the rest to the main body of solids. The resulting 0.25% sample is representative of the total bulk. Although the process was developed for handling coal, it is adaptable to other solids.

Wyandotte PLURACOLS have scores of applications







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You have a broad range of physical forms and molecular weights to choose from. There are four solid, and six liquid grades in the PLURACOL E series of poly*ethylene* glycols. The PLURACOL P series of poly*propylene* glycols includes four liquid grades.

In function . . . the PLURACOL polyglycols can be lubricants, softeners, solvents, plasticizers, humectants, binders, emulsifiers, defoamers, antidusting agents, surface-active agents, dispersing agents.

In application . . . they can frequently improve textiles, rubber, paper, paint, printing inks, pharmaceuticals, cosmetics, petroleum products, brake fluids, urethane foams.

They are chemical intermediates in forming mono and diesters, ethers, acetals, amines, amides, and thioethers.

These lists are far from complete even now, and new applications for the PLURACOL polyglycols are continually being found. If you have not evaluated them . . . write, detailing your requirements, and we'll forward samples and data. If you wish to explore new applications for the PLURACOLS . . . let us work with you. *Contact: Wyandotte Chemicals Corporation, Department 787-W, Wyandotte, Mich. Offices in principal cities.*

*PLURACOL® is Wyandotte's registered trademark for its polyoxyalkylene glycols.

Wyandotte CHEMICALS

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Pacing Progress with Creative Chemistry

Look how these 11 industries are making better products with

Is there an idea here for you ?

PAINT

Many of the top-quality vinyl paints in the fast-growing latex paint market are based on Du Pont "Elvacet". Reason: it's an All-Purpose vehicle—good for exteriors, interiors and primers—that costs less than other types of water-base paint vehicles. It has excellent mechanical stability, borax tolerance and good film-forming properties.

"Elvacet" base paints are quick-drying, easy to apply and clean up, mildew- and blister-resistant, and leave no odor. In addition, "Elvacet" brings you 12 years of Du Pont experience in formulating long-lasting, good-looking, low-cost vinyl latex paints.

PAPER

"Elvanol" is applied to paperboard for gloss-ink printing, it upgrades grease resistance of glassine paper, and its strong binding power helps improve pigmented coatings. "Elvacet" is used to produce high-quality greaseproof coatings for paper—either off-machine or on-machine during the papermaking operation. This is why mills throughout the country are coating and sizing paper with "Elvacet" and "Elvanol" to improve product quality.

ADHESIVES

"Elvacet" and "Elvanol" can work together or alone to produce a wide range of adhesives: from high wet-strength adhesives for beer, vegetable and fruit cartons to remoistenable adhesives for packages and envelopes. "Elvacet" and "Elvanol" adhere well to film, cloth, leather, wood, ceramics and many other materials. Both find use as binders in such applications as the manufacture of nonwoven fabrics and ribbons, and catalyst pellets.

CHEMICAL

"Elvanol" reacts with aldehydes to form polyvinyl acetals and is used as a non-ionic surfactant and protective colloid in the preparation of stable, high-solid polyvinyl acetate emulsions. "Elvanol" also is used to disperse oils, waxes, plasticizers and resins.

TEXTILES

"Elvanol" has many advantages as a warp size: it's strong, noncorrosive, does not spoil, can be desized with hot water, and has an extremely low BOD. "Elvanol" also modifies thermosetting resins in "wash 'n wear" fabrics. "Elvacet", as a textile finish, imparts stiffness and hand to a variety of fabrics.

FILMS

Films made from "Elvanol" have tensile strengths up to 22,000 lbs. per square inch. These films are not attacked by most organic solvents, grease or oil, and are impervious to most gases. Some types of film made with

ELVACET®
(polyvinyl acetate emulsion)

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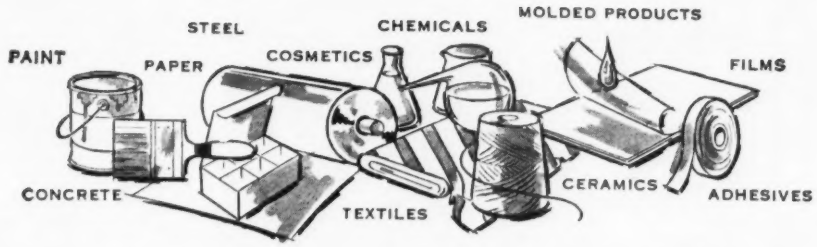

Du Pont "Elvacet" and "Elvanol"

(polyvinyl acetate emulsion) (polyvinyl alcohol)

"Elvanol" are cold-water-soluble and disintegrate in seconds after immersion in water. Uses are almost unlimited in unit packaging of insecticides, bleaches, dyes, detergents, etc.

CONCRETE

Addition of "Elvacet" and "Elvanol" to mixtures of cement and sand improves the workability of the wet mix and increases the strength of the concrete. "Elvanol" increases adhesion between old and new concrete.

CERAMICS

Fine china flatware is manufactured faster and easier with "Elvanol". As little as 0.1% of this polyvinyl alcohol added to a short casting slip greatly improves working characteristics. "Elvanol" also serves as a strong and uniform temporary binder for ceramics, and is used in the preparation of stencil screens for decorating these products.

COSMETICS

Cold creams, cleansing creams, shaving creams and facial masks based on "Elvanol" have been formulated. Reason: It has outstanding emulsifying, binding, film-forming and thickening properties so necessary in cosmetics.

MOLDED PRODUCTS

"Elvanol" can be formed into strong, flexible, highly resistant, rubber-like articles such as tubing, rods and sheeting. Such tubing finds use in lubricating equipment and fuel lines of automobiles and aircraft—wherever resistance to oil, certain chemicals and gases is required.

STEEL

Dilute solutions of "Elvanol" can be used to quench steel. Such dilute polyvinyl alcohol quenchents eliminate cracking that often occurs with water, and produce a degree of hardening that falls between that obtained with a water quench and an oil quench.

ELVANOL®

(polyvinyl alcohol)

MORE INFORMATION AND TECHNICAL HELP

Perhaps these uses of Du Pont "Elvacet" and "Elvanol" suggest a way in which you can profitably use these versatile products. The facilities of a new two-million-dollar Sales Technical Laboratory are at your disposal, and experienced Du Pont specialists will be glad to work with you to help develop your ideas into actual uses. Call your Du Pont Representative—District Offices are listed below.

If you'd like more information, write on company letterhead for these booklets. They fully describe the properties, applications and advantages of Du Pont "Elvacet" and "Elvanol".

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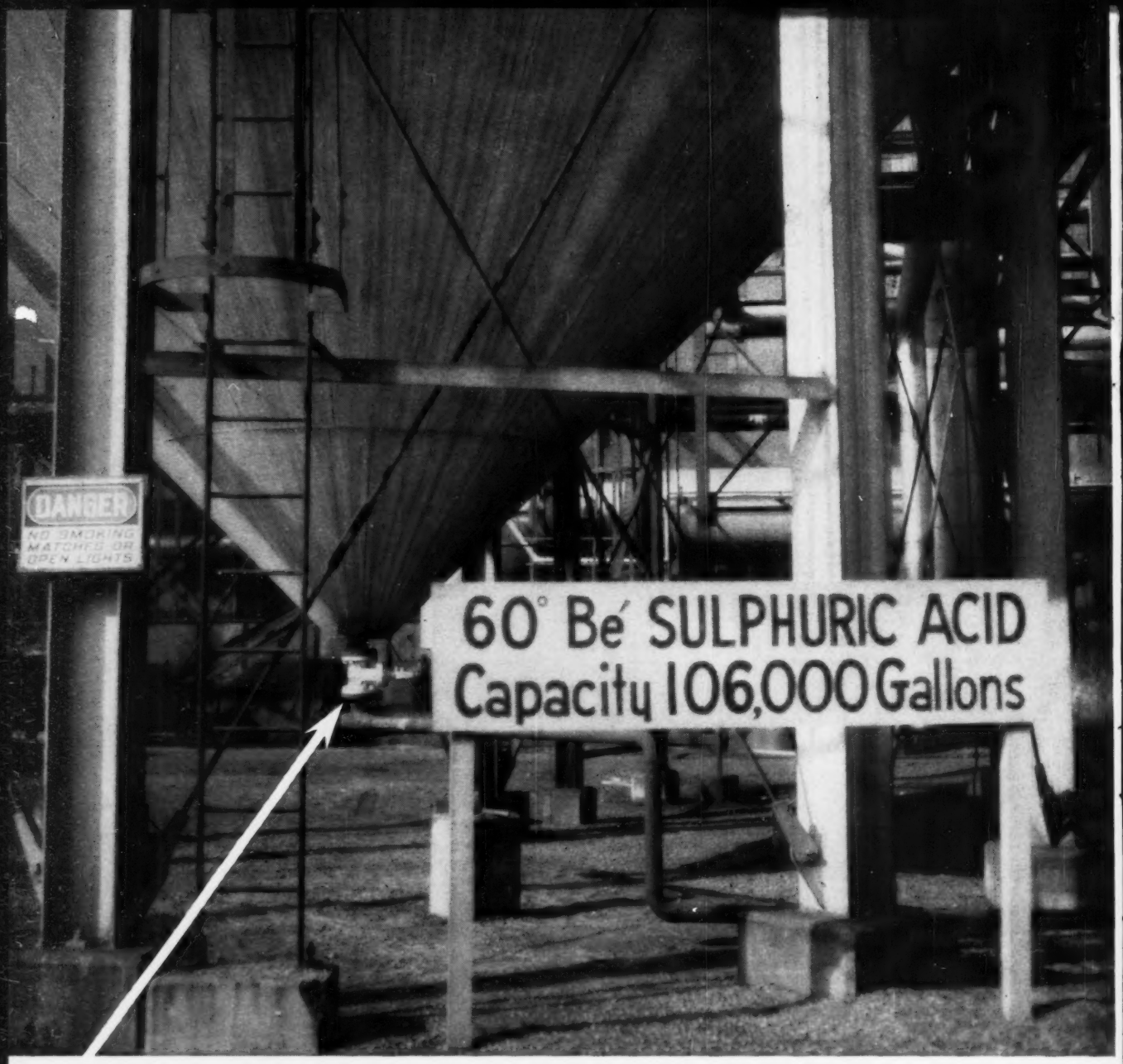

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Market Newsletter

CHEMICAL WEEK
May 14, 1960

Full-scale production of high-analysis fertilizer has started at Olin Mathieson's Pasadena, Tex., plant, following completion of a $1.5-million addition to the firm's existing unit. The new facilities boost capacity 40% to more than 1 ton/minute of pelletized fertilizer, consisting of high-analysis ammonium phosphate made from ammonia, sulfur, potash and phosphate.

High-analysis fertilizer is becoming increasingly important. In '49, these materials accounted for 12% of all fertilizers used in the U.S.; in '59, 41% of the 25 million tons of fertilizers used consisted of these types, included 550,000 tons of ammonium phosphate products.

•

The British government's stockpile of tin is now exhausted, according to Georges Peter, chairman of the International Tin Council in London. The entire stockpile of 5,000 long tons was liquidated by the end of February, on terms the U.K. Board of Trade considered "very satisfactory."

Completion of the tin sell-off should help firm prices significantly, but observers point out that the tin market will now become far more sensitive to normal supply/demand pressures.

Total permissible exports of tin by six producing members of the International Tin Council will be 37,500 long tons in the July-September period; this quota is the same as during the current quarter.

•

Du Pont has completed a capacity-doubling of its high-purity silicon plant at Brevard, N.C., simultaneously has begun marketing a new silicon product in the form of gold-doped single silicon crystals. Microscopic amounts of gold added to the silicon provide resistivity characteristics needed in manufacture of high-speed switch diodes.

The gold-doped silicon is tabbed at a high $1,000/lb., but is actually delivered in small quantities at $2.20/gram (this compares with prices ranging from $700-1,400/lb. for regular single-crystal hyperpure silicon).

Meanwhile, encouraging news for U.S. silicon producers—who are worried about increased competition from Japanese-made electronic components—comes from a U.S. transistor manufacturer. U.S. Transistor Corp. (Syosset, N. Y.) claims U.S. production ingenuity, coupled with automation, will beat the Japanese, whose competitive advantage lies mainly in low wage rates.

The firm is currently marketing a six-transistor kit used to make portable radios. Its $2.75 price is below the cost of competitive Japanese kits, when import duties and freight charges are included.

U.S. Transistor's frontal attack on Japanese competition contrasts sharply with tactics heretofore used by the U.S. electronics industry —i.e., pressuring the U.S. government to lend a hand by strengthening protective tariffs (*CW, Oct. 10, '59, p. 65*).

•

Importance of difference in wages paid workers in the U.S. and foreign countries is minimized as a factor in the increasing difficulties many U.S. manufacturing firms are experiencing—especially in marketing their products abroad.

Laurence Dowd of the University of Michigan School of Business Administration last week declared that troubles of most U.S. firms result from slipshod marketing practices rather than price structures and wage costs, which are usually cited as competitive disadvantages suffered by U.S. manufacturers.

As evidence, Dowd points out that Michigan has the highest wage rates of any state but originates the largest volume of exports; he also notes that some top-wage-paying U.S. industries are also the largest-volume exporters. Examples: the coal, tire and tube, and metal-working machinery industries.

•

Largest chemical terminal in the Pacific Northwest will be set up at Vancouver, Wash., by McGuire Chemical, which now has California terminals at Oakland and Los Angeles. When completed, the new terminal will have storage capacity for several million gallons of chemicals and 36,000 sq. ft. of warehouse space. Cost of the installation will be $350,000.

McGuire specializes in handling chemicals shipped by tanker from Eastern and Gulf Coast manufacturers for bulk distribution throughout the West, or for blending and packaging in final product form before distribution.

•

First bulk shipment of ortho-xylene to Japan by California Chemical International (Oronite Chemical affiliate) has been completed. Delivery was to the Japanese trading firm Toyomenka Kaisha, which will distribute the product to Nippon Catalytic Chemical Industry Co. in the Osaka area. Additional shipments are planned for this year.

SELECTED PRICE CHANGES—WEEK ENDING MAY 9, 1960

	Change	New Price
UP		
Linseed oil, raw, dms., c.l., N. Y.	$0.02	$0.168
Soybean oil, crude, tanks, Decatur	0.00125	0.08
DOWN		
Coconut oil, crude, tanks, N. Y.	$0.005	$0.1625
Coriander oil, USP, bots.	1.00	8.00

All prices per pound unless quantity is quoted.

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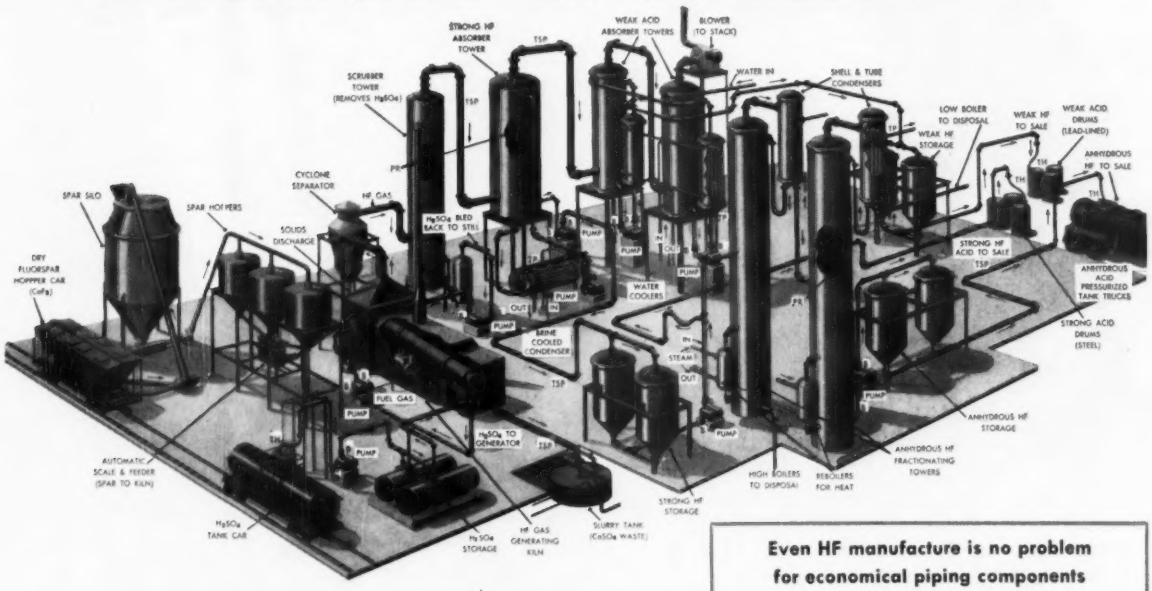


Even HF manufacture is no problem for economical piping components of Fluoroflex-T

Check these Fluoroflex-T piping components for economy, installation ease, long life!

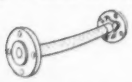
TSP **FLUOROFLEX-TS—Lined Steel Pipe**

Prefabricated to length with flanges—ready to assemble. Minimizes assembly time, shortens checkout time. Complete family of fittings available.

B **FLUOROFLEX-T—Bellows-Flex Joints**

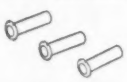
Molded rather than machined, for unparalleled flex life. Damp out equipment vibration, adjust to longitudinal and temperature movements, add years to life of equipment and piping.

TH **FLUOROFLEX-T—Transfer Hose**



Completely corrosion-resistant, long flex life. Cover of rubber or of stainless steel braid.

TP **FLUOROFLEX-T—Condenser Tube Protectors**



Eliminate erosion and corrosion by high-velocity acid on entry side of condenser tubes.

PR **FLUOROFLEX-T—Raschig Packing Rings**

Economical, durable, corrosion and erosion resistant, with only ¼ the weight of monel rings! Simplify tower design, costs, maintenance.

FLUOROFLEX-T—Dip Pipes, Spargers, Thermowells

Corrosion-resistant nozzle openings, steam nozzles, instrument wells in process equipment.

OVERALL ECONOMY is the key word in Fluoroflex®-T piping installations: ease of installation, decreased maintenance, long equipment life, and elimination of process headaches and downtime.

Now, as was done in the HF diagram above, it is possible for you to pipe your entire corrosive process from start to finish in corrosion-impervious, money-saving Fluoroflex-T! One plant, in fact, equipped with Fluoroflex-T reported savings of $60,000 per month in costs of maintenance, downtime, and product loss!

RECENT PRICE REDUCTIONS in many of the most popular sizes of Fluoroflex-TS lined steel pipe have been made possible by advanced technology, production improvements, and increased sales volume. These substantial price reductions made Fluoroflex-TS lined steel pipe more competitive than ever, on an installed-cost basis, with other corrosion-resistant piping materials!

Fluoroflex-T, the proprietary Teflon® product manufactured and fabricated solely by Resistoflex, is completely resistant to *any* chemical (except high-temperature fluorine and the molten alkali metals) up to 500°F.! Combining optimum flexibility, non-porosity, and strength, it is now available for process use in a complete family of Resistoflex piping components (see panels), in a complete range of sizes and hook-ups to fit any flow, process, or process path.

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Fats and Oils Target: New Nonfood Markets

U.S. production of fats and oils in '60 will continue to outpace demand, as the industry looks forward to another record crop year and increased cattle and hog slaughter. With U.S. consumption by the food industries expected to remain fairly steady over the next few years, increasing emphasis is now put on development of new industrial outlets.

Nonfood markets now account for only one-third of all fats and oils consumed in the U.S.; in '59, the nonedible fats and oils market amounted to 4.1 billion lbs. In contrast, consumption of fats and oils in food products is almost double that of the inedible products, amounting to a little over 8 billion lbs./year.

U.S. per-capita consumption of fats and oils in food products is currently the highest in the world, and most observers foresee a normal growth in this end-use during the next few years, closely paralleling population increases.

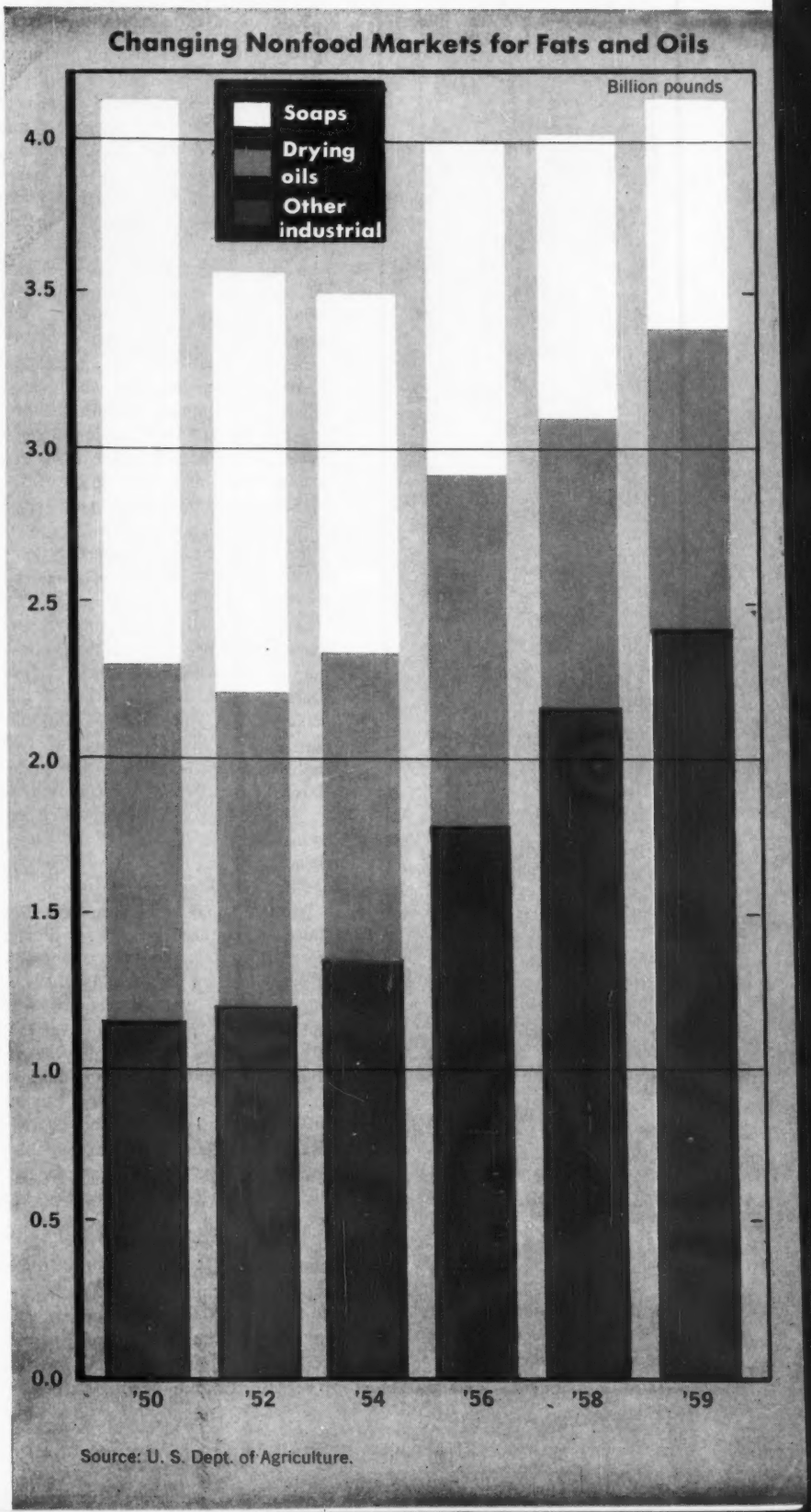
But overseas, particularly in underdeveloped countries, per-capita consumption of fats and oils is very low; consequently, these countries continue to shape up as important potential markets. Because production in many overseas areas is not expected to satisfy local demands, U.S. exports will probably remain substantial.

In Japan, for example, fats and oils imports have been increasing at the rate of 5-6%/year. Last year, however, imports jumped 50% to 1.2 billion lbs., from 800 million lbs. in '58.

U.S. exports are now sharing a large part of the increases in these overseas markets. In '59, a record 5.3 billion lbs. of fats and oils were sent to foreign shores—an increase of 36% over '58.

Still, current U.S. surpluses of fats and oils are at a high level, estimated to be about 4 billion lbs./year. And, with continuation of heavy crop years, plus increased yields/acre, problems of oversupply will spur development of new industrial outlets.

Changing Industrial Markets: During the '50s, nonfood markets for fats and oils underwent two oppos-



ing trends. Consumption in soap manufacture was on the downturn—losing ground to the synthetic detergents — and growth of latex paints was cutting into use of drying oils. Partly offsetting these losses was the growing use of fats and oils in animal feeds.

Last year the downward movement of the fats and oils in soaps and drying oils continued. U.S. consumption of these materials in soap manufacture, in '59, is estimated at about 857 million lbs., a drop of 6% below '58, and equivalent to about 45% of the amount used in '50. Consumption of drying oils also continued on the downgrade, took an estimated 903 million lbs. of fats and oils in '59, representing a drop of almost 2% below '58 demand, and about 75% of '50 consumption. Within the drying oils market itself, major changes have taken place. Linseed oil, which at one time had over 85% of the drying oil market, has now given way to the cheaper tall oil and soya oils. Today linseed commands only about 45-50% of the drying oils market.

Animal feeds provide the fastest growing market for fats and oils—output almost tripled in the last four years. In '55, use of fats and oils in feeds was slightly over 200 million lbs., in '59, an estimated 600 million lbs. Most of the raw materials used in animal feeds consist of inedible tallow and grease, which account for 85-90% of all the materials consumed. Some vegetable oils are also used for this purpose.

More Emphasis on Research: Because of continuing crop surpluses, research by both the government and private industry is stressing the development of new outlets for fats and oils. The U.S. Dept. of Agriculture is spending $16 million/year on utilization research, while additional research programs are being carried out by various growers' and processors' organizations. The Soybean Council of America, for example, has pledged $50,000 to the recently set up Soybean Oil Research Conference, to develop new markets for their products (*CW, April 16, p. 114*). Part of the government's program includes a $500,000 research project on chemicals derived from exotic seeds (*CW, April 9, p. 53*).

Biggest research payoff, so far, is the rapid market growth of fats in animal feeds. Several other projects have also reached commercialization, while a few more are in the development stage.

Synthetic detergents—which caused a drastic reduction in consumption of tallow and coconut oil in soap manufacture — is now an important outlet for coconut oil. As a raw material in the preparation of alkanolamides, coconut oil has found a growing market in this largest class of nonionic detergents. Spurred by increasing popularity of liquid detergents, manufacture of this group of nonionics will call for use of more coconut oil in the next few years. One drawback: fluctuations in the supplies and prices of coconut oils makes them vulnerable to replacement by synthetic materials.

Synthetic lubricants made from esters of sebacic acid (derived from castor oil) and azelaic acid (from tallow) make another promising market; the low price of these raw materials will probably give the derivative acids an edge over other competitive materials (*CW, Jan. 23, p. 72; April 4, '59, p. 69*).

In the paint field, oils are finding new uses. Linseed oil emulsions are being developed, and considerable interest is being shown in safflower oil's property of not yellowing in paint formulations.

Other expanding markets for fats and oils include: epoxidized soybean oil (a 35-40-million-lbs./year market) for plasticizers and color stabilizers in polyvinyl chloride.

Manufacture of vinyl stearate provides another rapidly growing market, absorbs about 2 million lbs./year of fat. As a plasticizer, vinyl stearate is reportedly replacing other synthetic materials.

Dimerization of fatty acids is used to make 36-carbon dibasic acids, useful in paints, resins, plastics and adhesives. The trimers — 54-carbon tribasic acids — already have a multimillion-pound market in jet airfield pavings.

Other areas under study include: sugar-based fatty acid esters for use in making detergents; Rilsan — nylon-11 — which is derived from castor oil (it already has some markets in foreign countries).

Distribution of fats and oils for edible products and soaps are han-

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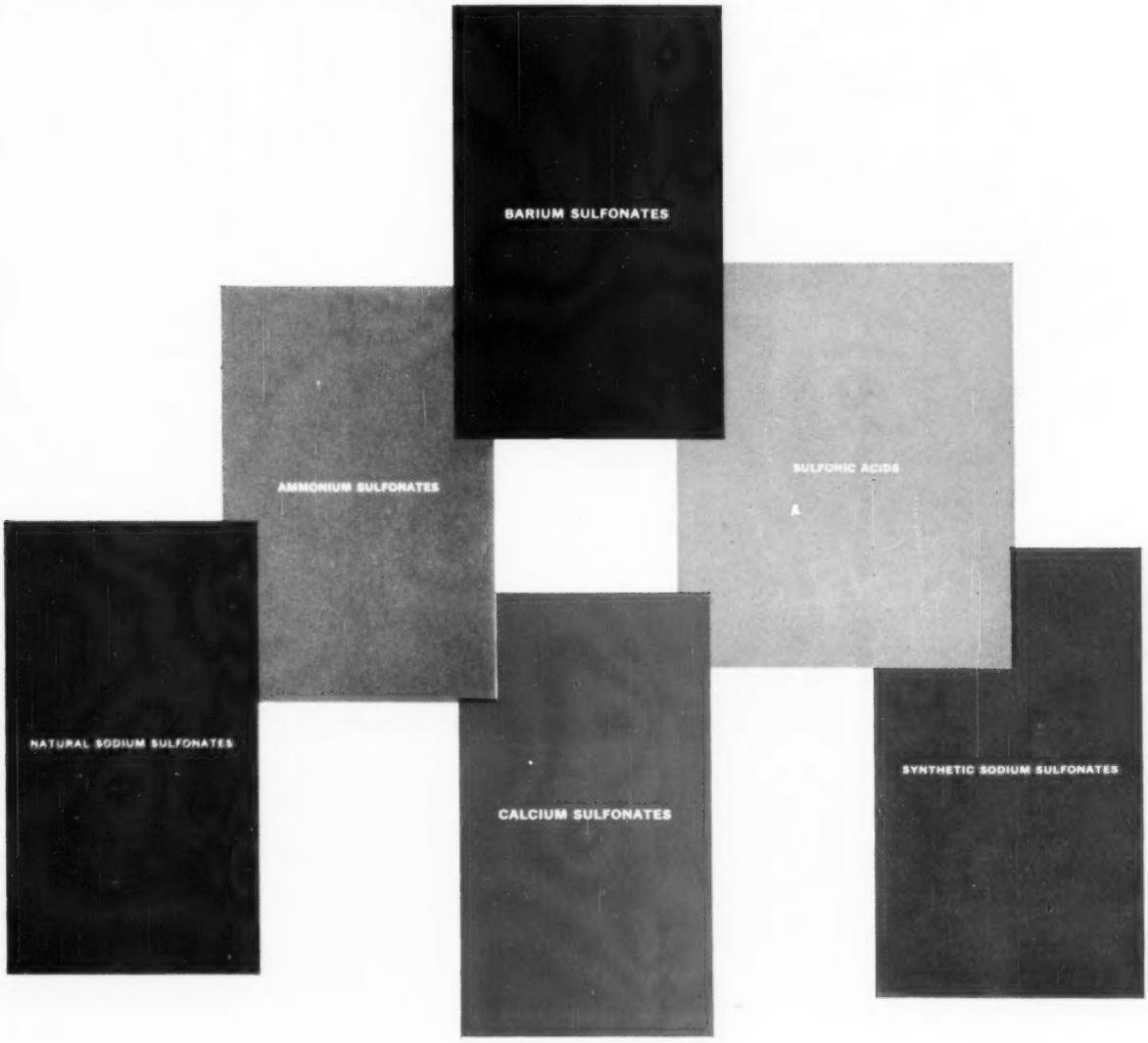

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dled mostly through brokers; industrial products are usually sold directly through sales offices or agents of the fats and oils producers. Most firms side-step brokers, do their own exporting.

Some of the major fats and oils producers in the U.S.: Pacific Vegetable Oil, A. E. Staley, Central Soya, Cargill, Archer - Daniels - Midland, Spencer Kellogg, Minnesota Linseed, Procter & Gamble, and General Mills, Inc.

Problems of oversupply and low prices are expected to plague the fats and oils industry for some time to come. Because many fats and oils producers are CPI-oriented, long-range answers to these problems are being sought through intensive research and development of chemicals derived from these raw materials.

Bismuth Gain

Fnal '59 market figures on bismuth metal are available from the Bureau of Mines this week. Compared with '58 data, they show: an increase in industrial consumption, a decline in imports and a drop in consumer inventories.

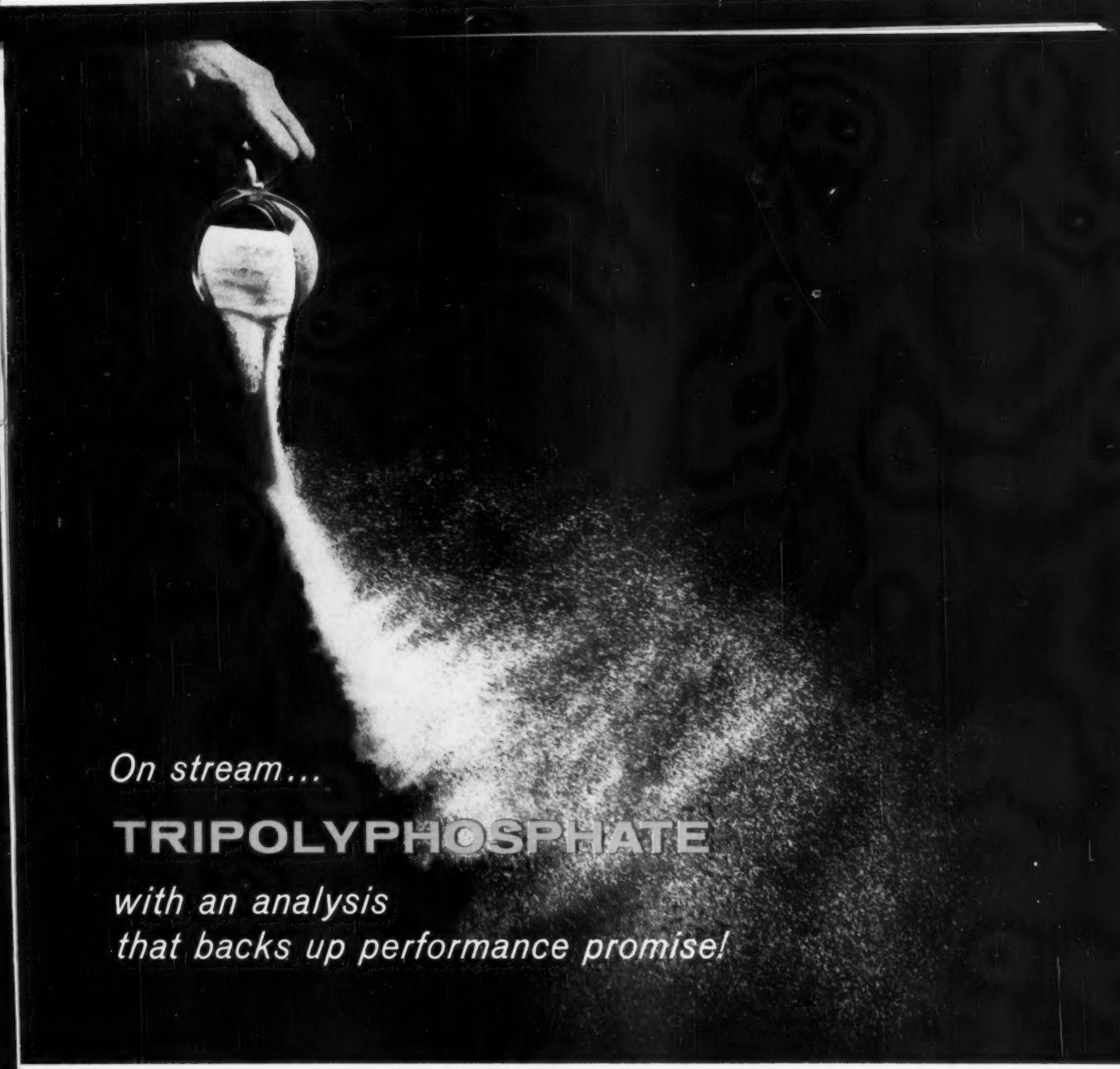
The U.S. consumed 1.5 million lbs. of refined bismuth in '59, an increase of 19% over the '58 level. Most of the increase came in the second quarter of the year, with a third-quarter leveling off, followed by a decline in the last quarter due to labor strikes and seasonal factors.

The big dropoff during the year was in imports of refined metal, which were down 28% below '58 levels. Heavier demands in Europe, plus the relatively small increase in U.S. demand for the material, were the chief factors.

The combined effect of increased consumption, plus a decline in imports, helped pare stocks of metallic bismuth held by consumers and dealers. Year-end inventories in '59 were down to 472,600 lbs., a drop of 13% below the 546,100 lbs. on hand at the end of '58.

Exports of bismuth metal and alloys (gross weight) totaled 179,700 lbs. in '59, a drop of 43% from the 316,300 lbs. exported in '58.

Major application of bismuth is in metal alloys, although large amounts are used in pharmaceuticals, industrial and laboratory chemicals.



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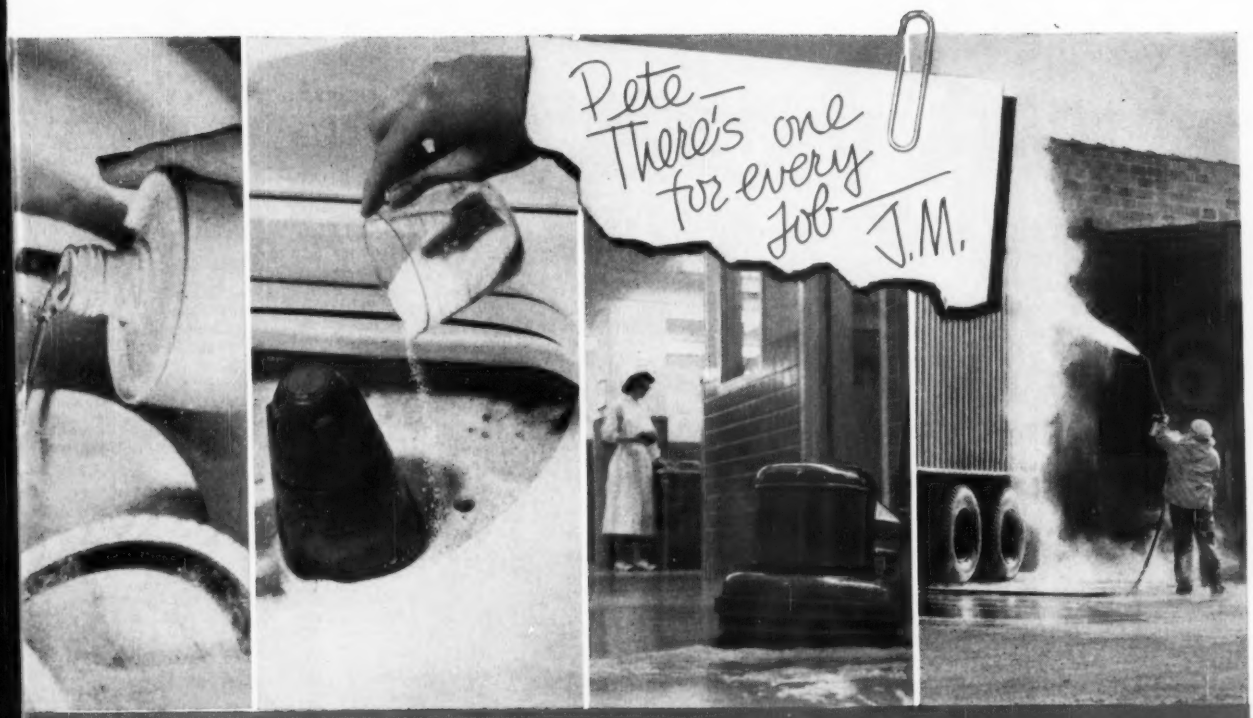
The right alkyl aryl sulfonate for every formulation

Which Ultrawet is right for you?

Check this chart... you'll find an Atlantic Ultrawet for every formulation!

	Ultrawet	Solids	Molecular Weight	Appearance	Active Minimum	Recommended Applications
LIQUIDS						
Clear	30DS	30%	Medium	Clear, pale yellow	25.5%	Penetrant, wetting agent, metal cleaner, emulsion polymerization.
	60L	60%	High	Clear, pale yellow	60.0%	Liquid detergents, wet textile processing, shampoos, car wash, household detergent formulations, janitorial supplies.
	35KX	35%	Medium	Clear, pale yellow	31.5%	Liquid detergents and household cleaners, wet textile processing, emulsion polymerization, post stabilizer for emulsions.
Slurries	35K	35%	High	Pale yellow	31.5%	Drum-dried and spray-dried cleansing compounds, light and heavy duty liquid detergents.
FLAKES	DS	100%	Medium	Light, cream colored	90%	Industrial detergents, emulsifier, dry mixing with alkalies, air entraining agent.
	K	100%	High	Light, cream colored	90%	Industrial detergents, heavy-duty household detergents, emulsifier, dry mixing with alkalies.
	K Dense	100%	High	Light, cream colored	90%	Same as above.
	KX	100%	Medium	Light, cream colored	90%	Same as 35KX in dry form.
	KX Dense	100%	Medium	Light, cream colored	90%	Same as KX—except smaller particle size with increased density, air entraining agent.
BEADS	SK Bead	100%	High	White, free flowing	40%	Light-duty household detergents, dry mixing with alkalies.
	SK Bead High Density	100%	High	White, free flowing	40%	Same as above—synthetic wool washes, air entraining agent.



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2 Superior Foam. Your detergent produces copious quantities of foam with prolonged stability, affording more cleaning efficiency.

3 Light Color. The excellent, light colors of Atlantic Ultrawets produce better color and better color control of all finished products.

4 Freedom from Odor. Atlantic Ultrawets have minimum odor resulting in greater shelf-life odor stability.

Chemically the Ultrawets are alkyl aryl sulfonate type anionic surface-active agents with less than 0.1% unreacted oil content. They are stable in acid and alkaline media; and their low sensitivity to calcium, magnesium, and other heavy metal ions makes them especially desirable in hard water. They are compatible with acid, alkaline, and neutral salts, soaps, anionic and nonionic detergents, and other materials commonly used in household and industrial cleaning compounds.

You are invited to consult Atlantic's experienced sales engineers, graduate chemists and chemical engineers especially trained in formulations employing any of Atlantic's great variety of Ultrawets. Without obligation, you will receive technical assistance and information to improve products or processes, or for developing new applications, or for new ways to cut manufacturing costs. Write to Chemicals Division, The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Pa.

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For complete information see Chemical Materials Catalog, pages 212-213.

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CW PHOTO—JOHN YAKATA

Garden chemicals—the business is now worth $300 million annually, and heading higher.

Sales Forecast: Balmy for Garden Chemicals

Spring is here—and the amateur gardener has begun his annual pilgrimage to the backyard. His object: to turn his patches of dandelions, ragweed and crabgrass into a flourishing garden. Helping in this hopeful project are the garden chemicals makers who, having learned the tricky techniques of selling highly technical products to nontechnical buyers, stand to do a $300-million (retail) business this year.

The mushrooming popularity of home gardening since the war—a boom that parallels rising suburban building and growing suburban populations—has presented agricultural chemicals makers with a huge market for gardening compounds.

Moreover, the boom continues. Howard J. Grady, president of California Spray Chemical Corp. (Richmond, Calif.), one of the biggest sellers in this field, believes the homeowner will have increasingly more leisure time for landscaping and gardening—and will be spending more money on gardening chemicals. He anticipates the boom will reach its peak at the end of the '70s, with the market quadrupling its present size by that time.

Seed Store to Garden Center: The old-time seed store, once the main outlet for garden chemicals, has virtually disappeared. In its place are supermarket-type garden centers, which are combined nurseries and garden equipment stores. In '56, there were less than 700 of these stores; today the number is well over 7,000, some of which do a multimillion-dollar/year business.

Other retail outlets that garden chemicals makers are finding profitable include garden shops in department and variety stores, drugstores and supermarkets, in addition to the traditional outlets like hardware stores.

Two types of companies supply these outlets: (1) the basic raw-material producers—e.g., American Cyanamid Co. (New York), with its bug-killing Malathion, and Velsicol Chemical Co. (Chicago), with Chlordane; (2) hundreds of formulators and packagers. Firms large and small are in the latter group—e.g., Du Pont (Wilmington) and Union Carbide's Consumer Products Division (New York), plus Cal-Spray, Armour Agricultural Chemical Co. (Atlanta), Swift & Co. (Chicago), American Agricultural Chemical Co. (New York), Antrol Garden Products Division of Boyle-Midway (New York), Acme, a subsidiary of Sherwin-Williams Co. (Detroit), and a host of regional and local marketers.

Ease and Education: The vigorous garden chemicals advertising going on this month emphasizes one main point: garden chemicals are easy to use. All agricultural chemicals marketers agree this should be the main selling pitch; they also realize the average gardener—as well as the average store clerk—needs education on what chemical should be used for what job.

Union Carbide, in the field three years with its Eveready line, tries to take the mystery out of buying agricultural chemicals by keeping the number of products low (it's selling 14 items this year), presenting label directions in simple, nonchemical terms.

Some of the most strenuous efforts

on the educational front have been made by Du Pont. Du Pont's "Garden Clinic Guide," pre-educating and preselling customers by showing them where, when and how to use garden products, has had wide distribution through dealers since it appeared in '58.

Other companies—e.g., Carbide Chemicals — supply bug identification charts to dealers. Another typical gimmick: running when-to-fertilize calendars in local newspaper ads.

Cyanamid is "preselling" Malathion on network TV—the Dave Garroway "Today" show.

Other big-league media have been tapped for preselling campaigns: slick national magazines such as *Life* and *Saturday Evening Post*, plus gardening books and local newspapers.

Armour salesmen are appearing before garden clubs and women's groups to talk and answer questions on gardening.

Armour is trying a psychological approach, too. The company switched its newspaper ads from Sunday gardening sections to Friday afternoon sports pages. It found a broader audience, plus more impetus for weekend shopping.

Success Story: In 59, Wasatch Chemical Co. (Salt Lake City), big seller in the West, increased its sales of gardening chemicals 40% over '58. It credits its half-hour, once-a-week TV garden clinic. Star of the show is one of Wasatch's own employees, horticulturist Arvil Stark, who demonstrates a gardening problem, then solves it with a Wasatch Morgro product.

Now in its third year, the program runs 13 weeks and is video-taped for showing in 11 Western states. Commercials from local dealers are dubbed in.

General Manager Lawrence Thatcher says one of the big benefits is that Wasatch dealers can see the support they're being given. He stresses that the main reason for using TV is that "we can accomplish a million dollars worth of effect on a $1,000 budget." Wasatch's sales in '59 were estimated at $4 million.

Packaging with Appeal: The days of the hard-to-handle, likely-to-spill 100-lb. fertilizer sack seems numbered. Today's home gardener is getting convenience when he buys garden chemicals Examples:

• This year Armour is marketing its Vertagreen specialty plant food in 5-lb., self-sealing, siftproof boxes. The automatic sealing is achieved by using a polyethylene bag to hold the fertilizer, in a box with a special corrugated liner.

• American Agricultural Chemical Co. has just introduced one-dose packets of Agrico plant food in laminated aluminum foil and polyethylene.

• Aerosol packages are also making a big dent in the home gardening field. An estimated $60 million worth of gardening items were sold in this country in '59.

During the next 15-20 years, the home gardener can expect even greater catering from the agricultural chemicals companies — e.g., multipurpose products designed to do several jobs, smaller and easier-to-use packages, more gardening information presented in simple terms. The manufacturers' reward may well be billion-dollar sales.

Beauty Mark

Sales of toilet goods in '59 set an all-time record. Retail business in perfumes, cosmetics and other toiletries amounted to $1.7 billion—a jump of 9% over '58, according to Toilet Goods Assn., Inc. (New York).

The rise in sales was distributed fairly well between various types of products. The few spectacular increases — e.g., eye make-up — took place in goods previously not big sellers.

Dentifrice sales in '59 were up about 3%. This represents a drop back to the normal rate of increase after several years of sharply increasing sales. Sales of shaving creams, higher by 5%, were boosted by the growing market for aerosols.

Despite federal scrutiny of coal-tar dyes, sales of lipsticks continued to increase at a little more than the rate for total toiletries. Hair preparations sales slacked off because of changing hair styles, but hair coloring preparations showed substantial sales growth.

According to the type of retail outlet, sales in department stores and drugstores decreased slightly, percentage-wise. Food store and door-to-door sales again rose but the rate showed some leveling off.

Add Insecticides

Four new insecticides have recently been released for general field evaluation. Three of these are products of Farbenfabriken Bayer AG. (Leverkusen, Germany) and are being made in the U.S. by Chemagro Corp. (Kansas City, Mo.). The other is a material developed by Wisconsin Alumni Research Foundation (Madison, Wis.).

The Chemagro materials are identified by experimental code numbers Bayer 29493, Bayer 28589 and Bayer 30686.

• Bayer 29493 is O,O-dimethyl O-[4-(methylthio)-*m*-tolyl] phosphorothioate. It's described as a successor to DDT for use against lice, ticks, flies, mosquitoes and bed bugs. It has been tested outside the U.S. under the tradename Baytex.

• Bayer 30686 and Bayer 28589 are both miticides. Chemically, 30686 is 2,3-quinoxalinedithiol cyclic trithiocarbonate; 28589, 2,6-di-tert-butyl-4-nitrophenol. Both are expected to be commercially available within a year. Besides acting as acaricides, they're supposed to control some foliage diseases.

The Wisconsin Alumni material, an organic phosphate, has been given the generic name of butonate. Chemically, it's O,O-dimethyl 2,2,2-trichloro-1-n-butyryloxyethyl phosphonate (*CW Technology Newsletter, Feb. 27*). It's a colorless liquid, soluble in most of the organic solvent used in insecticide formulations. It's also compatible with knockdown agents such as the pyrethrins. Most of the primary work with the insecticide has been confined to household insects such as houseflies and German roaches.

Aerosol Advance

A new process for pressure-filling aerosols through a metered valve has been developed by Armstrong Laboratories (West Roxbury, Mass.). Significance: meter-valve units need no longer be cold-filled, a process requiring freezing of product ingredients, which ruled out water-based products. The process now makes possible the pressure packaging of a new group of products—water-based pharmaceuticals.

The equipment used in the new filling line was designed and built by

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Nalco CHEMICALS

SPECIALTIES

Armstrong Labs. The unit includes a small metering propellant pump, a gasser assembly, and the assembly line itself. The metered valve was made by Emson Research, Inc. (Bridgeport, Conn.).

One major drug house is using the process to fill its foam skin preparation, which will appear on the market in about a week. Other drug firms are said to be considering the new technique.

The new foam preparation is being loaded by Armstrong (also a contract filler).

PRODUCTS

Fluorescent Pigment: Rhode Island Laboratories (100 Pulaski St., West Warwick, R.I.) has developed a new, fluorescent pigment, Violite 747, that emits fluorescences green under u.v. light.

•

Aspirin Suppositories: Aspirin in suppository form for rectal administration is available from Suppositoria Labs (158 Allen Boulevard, Farmingdale, N.Y.). Six strengths are available.

•

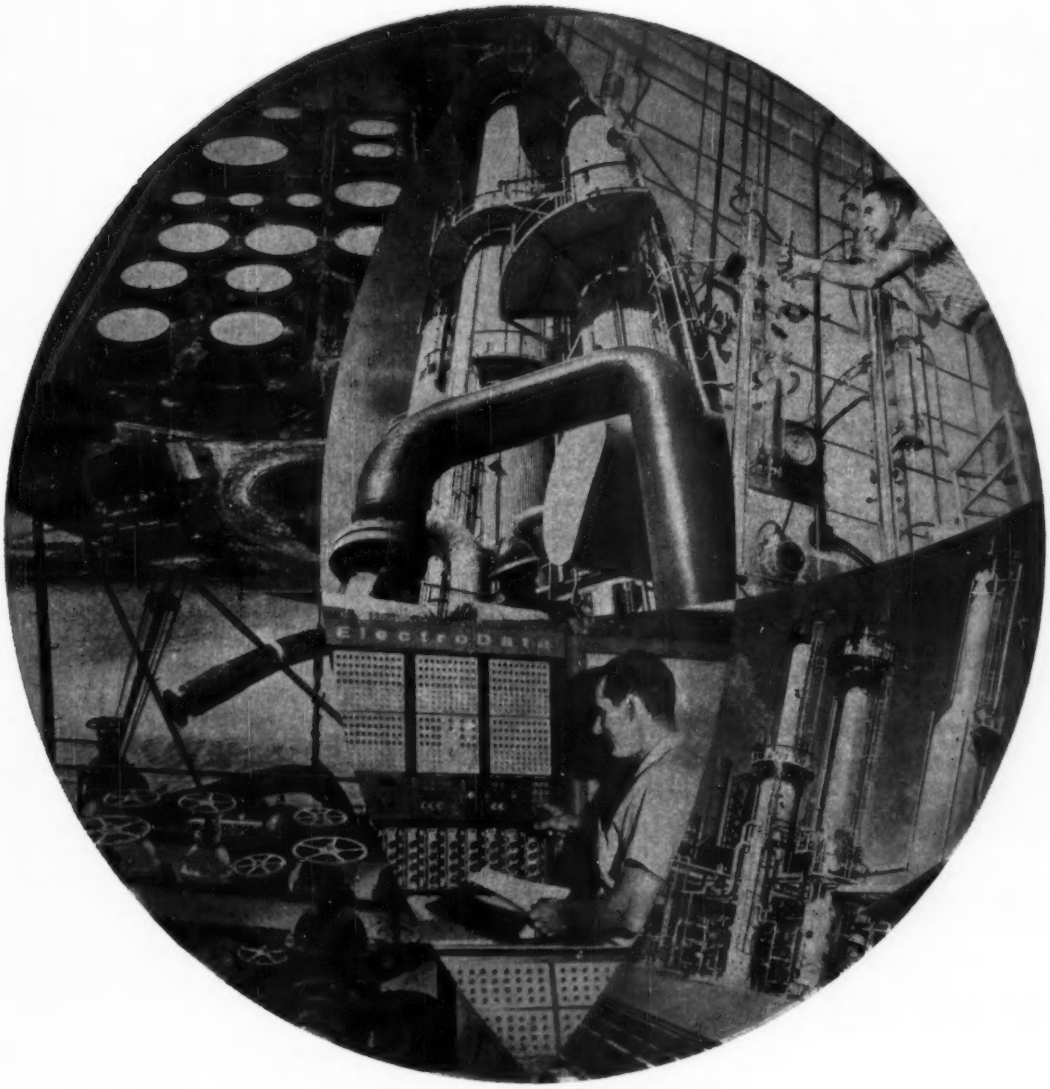
Medicated Aerosol Powder: Normand Pharmaceutical Co. (Miami) is offering a medicated powder for treatment of poison ivy, prickly heat, and allied skin conditions, in a 6-oz. aerosol (price: $1.59). The product contains sodium undecylinate, alkyl dimethyl benzyl ammonium chloride, pyrilamine maleate, allantoin, vitamin A, palmitate, and vitamin D in a calamine powder base.

•

Marking Ink: A permanent marking ink that's claimed to resist the effects of xylene, toluene, chlorothene and methanol is being offered by Melpar, Inc. (3000 Arlington Blvd., Falls Church, Va.). The epoxy-based material can be applied to metal, plastics, glass or wood, is available in white (heat-stable to 260 F) and black (heat-stable to 350 F). It's tradenamed Mel-Ink M-100.

•

Heat-Resistant Color Codings: Speco, Inc. (7308 Associate Ave., Cleveland), is offering a line of high-heat colors for coding. The coatings, tradenamed Heat-Rem H-170, can be applied to metal components subject to temperatures from 600 to 1700 F. Most contain a combination



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of nonleafing aluminum and a special metallic pigment. The coatings are available in 18 colors, and in 1-qt., 1-gal. and 5-gal. cans.

•

Refinery Antifoulant: An amber-colored, hydrocarbon-soluble additive designed to prevent organic fouling in refinery process equipment has been marketed by Nalco Chemical Co. (Chicago). The chemical stabilizer-dispersant, called Nalco 262, should be injected into naphtha and gas oil streams ahead of the point where fouling occurs.

•

Cause and Cure: A 48-page booklet from Rohm & Haas Co. (Washington Square, Philadelphia) goes into the causes of efflorescence and early chalking on painted masonry surfaces; includes methods to overcome and prevent this type of deterioration.

•

Adhesive: The Carboline Co. (32 Hanley Ind. Ct., St. Louis) is offering a nonvulcanizing, waterproof adhesive called Neoprene Adhesive F-1. It reportedly provides contact bonding, which eliminates the need for clamps or pressure.

•

Paint Concentrate: A fluid-type lecithin concentrate for use in water-based paints is being marketed by A. E. Staley Mfg. Co. (Decatur, Ill.). Emultex R is reported to stabilize the emulsion, prevent pigment migration, retard pigment settling. It's recommended for all types of water-based coatings, is sold in 55-gal. drums.

•

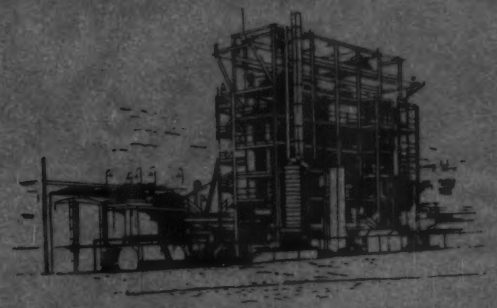
Marine Line: Du Pont (Wilmington, Del.) is launching a new line of specialties products — the 7 Seas— for boat owners. Included: Spark fuel additive, Perk crankcase oil additive, Showboat metal polish, Block aerosol spray to dry ignition systems and prevent metal corrosion, Snug water-repellent canvas dressing, and cellulose sponges in five sizes. All will be available in marine supply stores.

•

Silicone Spray: Krylon, Inc. (Norristown, Pa.), is now marketing an all-purpose silicone spray for lubricating fabric and metal surfaces, gears, hinges, locks, doors, fishing reels, etc.

organic chemicals

FROM ROHM & HAAS COMPANY



ACRYLIC MONOMERS

Acrylic Esters

Acrylates $CH_2=CHCOOR$

Methacrylates $CH_2=C(CH_3)COOR$

Polymers derived from this series of acrylic and methacrylic esters vary from soft, rubber-like, film-forming materials to hard, transparent plastics. These esters may be polymerized by bulk, suspension, solvent, and emulsion techniques. They copolymerize readily with a large number of other monomers and can contribute to the resulting copolymers: internal plasticization, better heat and light stability, improved compatibility with other resins, better adhesion properties, greater toughness, stability of emulsions, and solubility in alkalies. *Typical uses:* thermoplastic sheets and molding powders, solvent coatings, adhesives, latex paints, heat-resistant elastomers, binders for explosives, water-soluble thickeners, and emulsions for textile, leather, and paper finishing. Commercially available.

- Methyl Acrylate
- Ethyl Acrylate
- Butyl Acrylate
- 2-Ethylhexyl Acrylate
- Methyl Methacrylate
- Ethyl Methacrylate
- Butyl Methacrylate
- Hexyl Methacrylate
- Decyl-Octyl Methacrylate
- Lauryl Methacrylate
- Stearyl Methacrylate

Acrylic Acids

Glacial acrylic acid and glacial methacrylic acid are water soluble monomers which can be polymerized to water-soluble polymers.

$CH_2=CHCOOH$
Glacial Acrylic Acid

$CH_2=C(CH_3)-COOH$
Glacial Methacrylic Acid

They may also be copolymerized with other monomers to obtain polymers having varying degrees of solubility in alkali or water. *Typical uses:* In copolymers, small quantities of these acids can: 1) provide a product which can be vulcanized with metallic oxides without the use of sulfur, or can be cross-linked with diepoxides, diamines, glycols, etc., 2) improve freeze-thaw and mechanical stability of emulsions, 3) improve adhesion properties, 4) increase resistance to attack by oils, 5) provide an alkali- or ammonia-solubilizing group. Amphoteric copolymers may be produced by copolymerization with basic monomers such as dimethylaminoethyl methacrylate. These acids also serve as intermediates for the production of special esters such as glycol diacrylates and dimethacrylates. Commercially available.

Other Monomers

$CH_2=C(CH_3)-COCH_2CH_2N(CH_3)_2$
Dimethylaminoethyl Methacrylate

$CH_2=C(CH_3)-COCH_2CH_2NH-C(CH_3)_3$
t-Butylaminoethyl Methacrylate

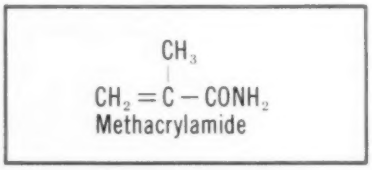
Dimethylaminoethyl Methacrylate (DMAEM) and *t-Butylaminoethyl Methacrylate* (*t*-BAEM) provide means for introducing amino groups into copolymers. Both copolymerize with vinyl-type

continued

organic chemicals FROM

Other Monomers (continued)

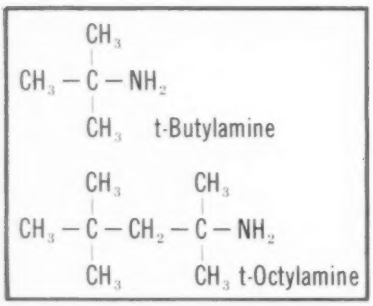
monomers and undergo addition to the double bond. DMAEM is a water-soluble monomer; it can be polymerized to a water-soluble cationic polymer, or copolymerized with an acidic monomer such as methacrylic acid to give a polyampholyte. Copolymers of *t*-BAEM exhibit good color properties. Individual reactions include: DMAEM—salt formation and quaternization; *t*-BAEM—typical reactions of the amine group via the active hydrogen. DMAEM and *t*-BAEM are suggested as intermediates for preparing anchoring agents for dyes, pigments, waxes, and moisture-proofing compounds . . . dispersing agents for non-aqueous systems . . . antistatic agents . . . ion exchange resins . . . emulsifying agents . . . and cationic precipitating agents.

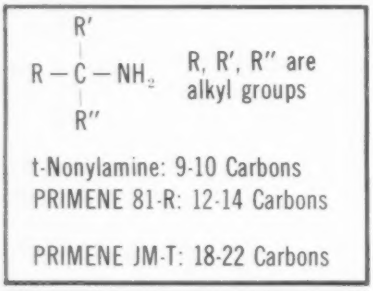


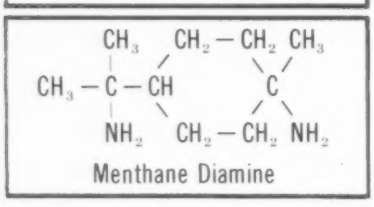
Methacrylamide is a water-soluble monomer which can be polymerized to a water-soluble polyamide, or copolymerized with other monomers to give a reactive group for cross-linking purposes. Other Rohm & Haas acrylic monomers include lauryl acrylate, decyl-octyl acrylate, and sodium methacrylate. Sodium methacrylate is available commercially. DMAEM, *t*-BAEM, methacrylamide, lauryl acrylate, and decyl-octyl acrylate are available in development quantities.

Lauryl Acrylate
Decyl-Octyl Acrylate
Sodium Methacrylate

t-ALKYL AMINES







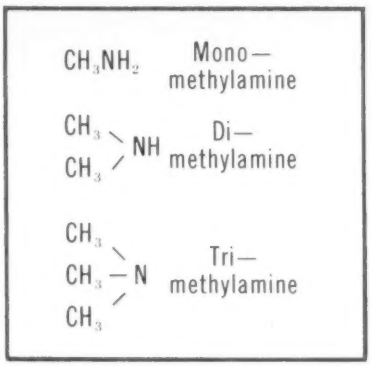
t-Butylamine, t-Octylamine, t-Nonylamine, PRIMENE 81-R, and PRIMENE JM-T have a number of unusual properties not found in straight-chain primary amines of corresponding molecular weight range. Some are: fluid character and low viscosity over a wide temperature range, color stability, resistance to oxidation, and excellent oil solubility. Although these amines undergo most of the reactions common to their straight-chain counterparts, the attachment of the amino group to a tertiary carbon imparts unusual reactivity to t-alkyl amines in several reactions—e.g. formation of principally secondary amines in amino-hydrogen substitution reactions, and formation of stable aldimines ($R- N=CHR'$), carbodiimides ($R-N=C=N-R$), and t-alkyl-cyanamides ($R-NH-CN$). The last three derivatives of normal primary amines are relatively unstable. *Typical uses:* Intermediates for bactericides, surface-active agents, rubber chemicals, anti-foaming agents, flotation agents, antistatic agents, fungicides, pharmaceuticals, antioxidants, dyestuffs, photographic chemicals, and insecticides. PRIMENE 81-R and PRIMENE JM-T are particularly useful as oil additives. Commercially available.

•

Menthane Diamine, a low viscosity liquid, is a primary alicyclic diamine. Like the other t-alkyl amines, it has its amino groups attached to tertiary carbons and thus exhibits "steric-controlled" reactivity which permits amino-hydrogen substitution reactions to form secondary amines, but inhibits tertiary amine formation. *Suggested uses:* curing agent for epoxy resins, and intermediate for preparing menthane diisocyanate, polyamides, and other organic chemicals. Commercially available.

ROHM & HAAS COMPANY

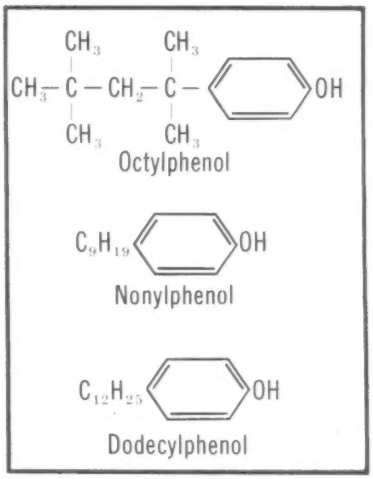
METHYLAMINES



Mono-, di-, and trimethylamine are very low-cost sources of amino nitrogen. They are worth investigating as intermediates in the preparation of agricultural fungicides, accelerators for rubber vulcanization, unsymmetrical dimethylhydrazine (for rocket propellants), surface-active agents, p-methylaminophenol (for photographic developers), 1,3-dimethylurea (an intermediate in the synthesis of theophylline and caffeine), analgesics not related to or derived from morphine, dimethylaminoethanol (an intermediate for local anesthetics and antihistamines), sympathomimetic drugs (e.g. N-methylphenethylamine or N-methylphenylpropylamine derivatives), choline chloride (poultry-feed additive), high-molecular-weight quaternaries, acid-gas absorbents, and explosives. Commercially available in aqueous and anhydrous forms.

ALKYLPHENOLS

Octylphenol is a flaked solid; nonylphenol and dodecylphenol —liquids. They undergo the normal reactions of the phenolic hydroxy group and nuclear substitution of the benzene ring. Reactions include etherification, condensation with aldehydes, esterification, sulfonation, halogenation, and nitration. Etherification of alkylphenols with ethylene oxide produces a variety of surface-active agents. Lubricating- and fuel-oil additives and vinyl stabilizers are obtained from calcium and barium salts of alkylphenol derivatives. Phenolic resins with improved oil-solubility, water resistance, and electrical resistance are produced by condensing formaldehyde with phenol and a small quantity of an alkylphenol. Octylphenol stabilizes ethyl cellulose against ultraviolet light degradation. Alkylphenols also offer possibilities in preparing fungicides, bactericides, dyestuffs, pharmaceuticals, adhesives, and rubber chemicals. Commercially available.



DYTOL Fatty Alcohols

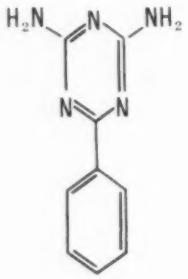
The DYTOL fatty alcohols have the general formula $CH_3(CH_2)_nOH$. Compositions are given in the table below. These fatty alcohols undergo many typical alcohol reactions. They may be ethoxylated, sulfated, esterified, halogenated, and dehydrated. They may be oxidized to aldehydes and carboxylic acids. *Typical uses:* Antifoaming and emulsifying agents. As chemical intermediates, DYTOL fatty alcohols are useful in making cosmetic-cream additives, polymerization regulators for rubber and plastics, textile finishing and softening agents, emulsifiers, lubricating-oil detergents, and quaternary ammonium compounds. Commercially available.

	DYTOL M-83 (OCTYL)	DYTOL A-24 (LAURYL)	DYTOL B-35 (LAURYL)	DYTOL J-68 (LAURYL)	DYTOL L-79 (LAURYL)	DYTOL E-46 (CETYL-STEARYL)	DYTOL F-11 (CETYL)
% Octyl (C_8)	98.0	none	none	none	none	none	none
% Decyl (C_{10})	2.0	1.5	1.5	1.0	none	none	none
% Lauryl (C_{12})	none	71.0	60.0	82.0	98.0	none	none
% Myristyl (C_{14})	none	27.0	25.0	17.0	2.0	1.2	1.0
% Cetyl (C_{16})	none	0.5	13.0	none	none	34.0	97.0
% Stearyl (C_{18})	none	none	0.5	none	none	64.8	2.0

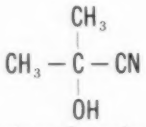
organic chemicals FROM ROHM & HAAS

OTHER ORGANIC CHEMICALS

Available in Commercial Quantities



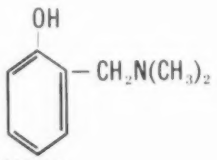
Benzoguanamine



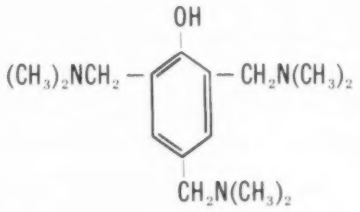
Acetone Cyanohydrin

$(CH_3)_2NCH_2CH_2N(CH_3)_2$

Tetramethylethylene Diamine

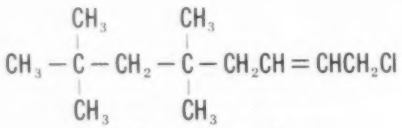


DMP-10
(Dimethylaminomethylphenol)

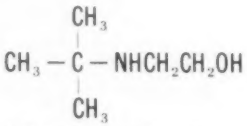


DMP-30
[2,4,6-Tri(dimethylaminomethyl) phenol]

Available in Pilot Plant Quantities



Dodecenyl Chloride



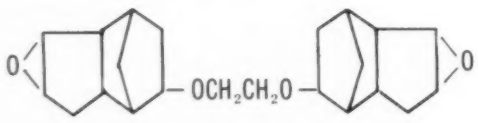
t-Butylaminoethanol

$R-NH-(CH_2)_{11}CH_3$

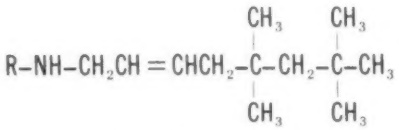
Amine RJ-2046
R = mixture of isomers having 12-14 carbons, with tertiary-alkyl structure.

$N\equiv C-CH_2CH_2COOCH_3$

Methyl Cyanopropionate



Diepoxide AG-13E
(Bis-Epoxydicyclopentyl Ether of Ethylene Glycol



Amine 9D-178
R = mixture of isomers having 12-14 carbons, with tertiary-alkyl structure.

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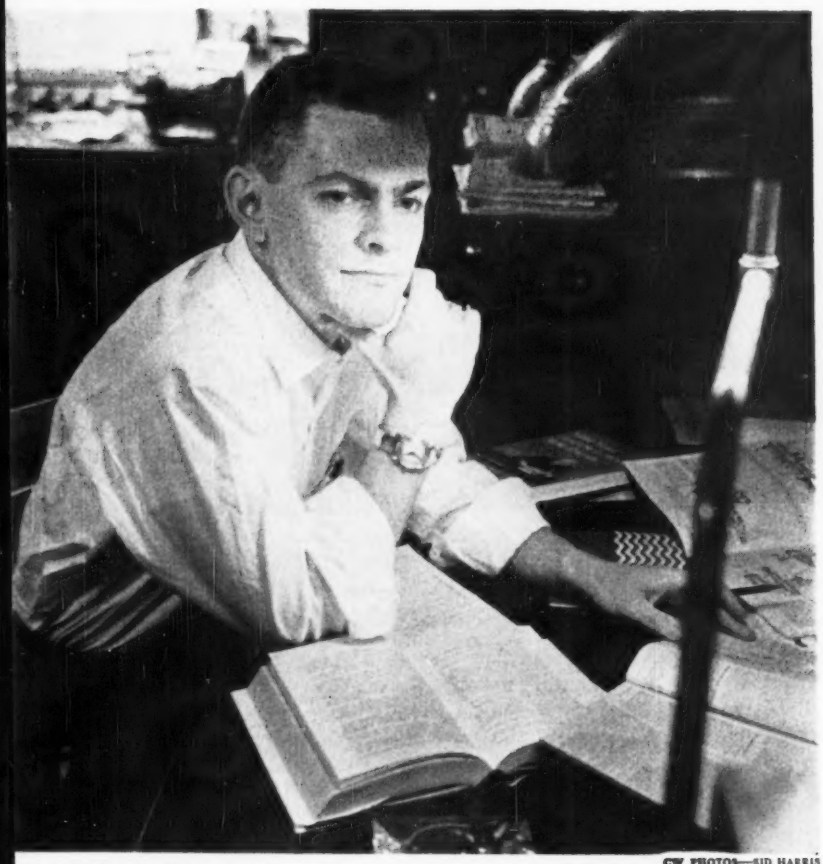

CW PHOTOS—SID HARRIS

Nalco staffer works late learning company policies, products.

Study Strengthens the Staff

More effective company representatives and managers is the aim of a new home-study program now in progress at the Industrial Division of Nalco Chemical Co. There are 60 Nalco staffers in the program, which, in novel correspondence school fashion, is designed to impart an intensive grounding in company procedures, policies, products and applications.

But the home-study feature—now getting its first application among Nalco marketing people, but adaptable to most management functions — is only one of the novel aspects of the do-it-yourself program. Also noteworthy in this regard is the dual nature of the program. Besides taking a "basic study" course, students also take a "continuous study" course that helps them to keep up to date.

A pilot group of 11 Nalco men—ranging from field salesmen to product managers and staff engineers—has already completed the basic program. Now, the first large group, some 60 strong, is enrolled. Nalco expects that almost all of its field and staff men will ultimately volunteer for the basic study.

Nalco became interested in the self-development approach about three years ago. At that time it was facing two special training problems:

(1) Sharp variations in quality, quantity, and pace of training among various field districts.

(2) Difficulty in making the training more uniform, since personnel is widely scattered.

After studying the problem, an informal committee arrived at the idea of the self-development program. Slightly different curricula were devised for field people and for staff members in the home office.

The program was specifically designed to "broadly strengthen" the students' technical knowledge and their ability to apply it in their sales jobs. Goals:

- Integration of technological know-how with skill in human relations.
- Systematization of training to bring all personnel to a high level of competence in the shortest period of time.
- Development of a program to stress practicalities as well as theories.
- Training men to analyze themselves in terms of knowledge and skill.

A special group screened literature and worked out the curricula, and the pilot group started studying in late '58. Some district and product managers were among the first to take the course.

Organization: Both field and staff courses are divided into two parts: basic study and continuous study. The study groups are further divided into "self study," "personal study" and "group study" phases.

All field and staff members are automatically enrolled in the continuous course. Enrollment in the basic course is voluntary, because candidates who volunteer are more likely to stick it out. Nalco does, however, encourage all its men to take the course.

Students are cautioned against expecting management positions. "The program is a self-development program," says the division's general manager, Leonard Robinson, "not a management-development course."

There is no time limit for the basic course. In the pilot group some finished within six weeks, others took nearly two years. Nalco figures the average will be 18-20 months.

Subject Matter: Subject matter in both field and staff courses is nearly identical—tailored where necessary to meet the needs of homeoffice or district conditions. The self-study section is composed of the Nalco service manual, magazine articles on a variety of technical subjects, a "Literature Pak" of questions and answers on several Nalco specialties. Moreover, there are eight books to be mastered in whole or in part—seven of them

Group study complements efforts made in self-help course.

dealing with sales and human relations.

Personal instruction — under the guidance of experienced tutors—complements the basic self-study, and centers on areas of company and district operation and policies, analytical and technical controls, and selling methods. To give the students opportunity to share other students' thinking, special conferences of new field men are held once a year in Chicago.

The continuous-study program is also similar for both groups. The self-study portion includes new sections for Nalco's service manual, temporary service manual sections, and timely books and articles. The personal-study sections cover mainly appearance, personal planning, salesmanship, technical skills, company procedure and area and account management.

Keeping Tabs: Nalco gives its students written examinations on the self-study phases of the course. Students fill out question sheets for marking by designated division personnel, who return them to the student. Although the student gains credit, no grades are kept to prohibit their use in any "punitive fashion."

Discovering how well students learned other lessons is done through questioning in private conferences. In judging students' answers, whether written or verbal, Nalco looks mainly for "over-all comprehension." This means that no specific passing grade is used for a set of questions, but, as Robinson says, the student "can't have many mistakes." Otherwise he's asked to repeat the section. At the end of the basic-study program—as well as at steps along the way—the student receives formal certification of accomplishment.

Reaping Benefits: Right now, says Nalco, it's too early to measure results of the program, but the firm hopes students will reap at least four major benefits.

(1) General over-all strengthening of individual job abilities.

(2) Uniform training for field and staff members, even in remote territories.

(3) Higher levels of technical proficiency among field and staff employees.

(4) Improved morale and motivation in the field and staff forces.

Employees who have taken the course echo those sentiments, cite direct practical benefits from their study.

The company estimates that course cost, including time Nalco personnel spend in evaluation and taking the course, is about $1,000/man, of which $100 goes for printed materials. Nalco believes it has found effective means of accomplishing its training ends, even with widely scattered offices and differing needs of personnel. And, at the price—the company feels—it's a bargain.

Payoff for Engineers

Median annual salaries of chemical engineers in the '56-'58 period led—at $10,436—those of all other types of engineers, according to a broad, new survey of 137,000 scientists and engineers by the Scientific Manpower Commission of the National Science Foundation. Median salary for all those studied was $7,936.

While chemical engineers got top money, others surveyed, who listed themselves as "working in the field of chemistry," did not fare so well. Their median salary was $8,660 during the period. The lowest medians—under $7,000—were reported by those in agricultural and biological sciences, meteorology, and psychology. Lowest median—in agriculture—was $6,625.

Employment: Of the 34,801 scientists or engineers in chemistry, 25,080 are in business or industry, or are self-employed; their median salary was $9,256. About 5,700 worked in educational institutions (median salary: $6,921), and 2,368 worked as civilians for the federal government (median salary: $7,916); the remaining 1,600 men worked in state, local or other governmental agencies ($6,833) and for nonprofit organizations ($7,923).

Fatter Wallet: Things were brighter for the much smaller group of chemical engineers. Vast majority, 4,202 out of 4,755, worked in industry or business or were self-employed, had a median salary of $10,442. Next largest group, 327, was in educational institutions at a median salary of $8,728. The federal government hired 147 at a median of $9,523 while nonprofit organizations hired 69 at $9,682.

Job Breakdowns: About 12,900, or about one-third of those reporting in the field of chemistry classified themselves as in general management or administration, or in management of research and development. The 8,002 who reported as general management earned median salaries of $12,578, while the 4,886 in the R & D category earned $12,903.

In chemical engineering the majority of the 4,714 reporting—2,338—were in general management or management of R & D. General management men—1,545 of them—got median salary of $14,048; the 793 R & D men got $13,936.

Cyanamid's Klipstein: For New Jersey, a down-to-earth program.

Thinning Big in PR

The newest statewide Chemical Industry Activities Committee — designed to improve industry and community relations—is now getting under way in New Jersey. While there are state groups in New York, Washington, Illinois, Delaware and elsewhere, they center their activities in metropolitan areas. In contrast, the New Jersey CIAC emphasizes statewide aspects of the process industries.

Aim: to strongly identify the chemical industry with the state.

Probably a strong factor in the new CIAC's formation is the planned move of American Cyanamid to New Jersey headquarters, bringing with it the personnel and know-how to help put the group's goals across. Chairman of the committee is Cyanamid's Executive Vice-President Kenneth Klipstein. His deputy chairman is John Fasoli, the company's manager of services, Organic Chemicals Division.

Other companies have pitched in too. On the committee from other companies are Du Pont, Hercules Powder, Allied Chemical, Celanese, Merck, Hoffmann-La Roche, Food Machinery and Chemical, Union Carbide.

Grass Roots Sell: Need for emphasis on harder-hitting community relations has been brought home by such examples as the recent relatively poor reception to Chemical Progress Week in the state. "With a few exceptions, the results—or lack of them—speak for themselves," Fasoli says. "This is especially unfortunate, since New Jersey ranks first in the U.S. in the manufacture of chemicals, from a dollar standpoint." Some 87,700 em-

what's your best estimate?

. . . a quiz for Chemical Executives who want to keep posted

QUESTION 1. In 1959, 28 plants in the United States were producing ethylene—the hydrocarbon intermediate which is way ahead of all others both in quantity produced and in versatility. What was the estimated total U. S. capacity for this valuable chemical in 1959?

a — 3.7 Billion Pounds

b — 4.9 Billion Pounds

c — 5.6 Billion Pounds

d — 6.4 Billion Pounds

QUESTION 2. How many of the U. S. ethylene plants were designed, engineered and constructed by the Lummus Company?

	PLANTS	CAPACITY
a	3	.4 Billion lbs.
b	5	.6 Billion lbs.
c	7	.8 Billion lbs.
d	9	1.0 Billion lbs.

ANSWERS: 1. *The answer is (c)—5.6 billion pounds, according to* Chemical Week's *Report on Ethylene, May 9, 1959.*

2. *Again the answer is (c). In the last 10 years Lummus has 7 Ethylene plants to its credit in the U. S. alone with a combined capacity of .8 billion lbs. Lummus' world-wide total is 13, with a combined capacity of over a billion pounds per year. For ethylene projects, or any type of process plant, call on Lummus' 50 years of experience in design, engineering and construction.*

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ployees work in almost 1,000 chemical processing plants, CIAC points out, and produce more than $1.5-billion worth of chemicals each year. Chemical making is the state's largest industry.

Blame for the lack of success accorded Chemical Progress Week rests largely on an apparent public apathy and lack of interest by the local press. True, CPW got a proper start. New Jersey's Gov. Robert B. Meyner devoted a television program to the state's CPI activity in which he discussed the industry with the state's CPI leaders. But the otherwise disappointing results of CPW make it clear that the committee must do more grass-roots education and selling, within the industry and at a community level. Its job is complicated: it feels it should use an approach that won't duplicate the highly professional activities of its sister CIAC in New York City.

Many projects are being planned by individual companies. The committee itself will function mostly as a clearing and exchange bureau and—along with its sponsor, the Manufacturing Chemists' Assn.—as advisor to plant managers who are generally saddled with community relations responsibilities.

Special emphasis will be put on work with students and teachers of chemistry and on programs of special community interest, such as air and water pollution. Little will be done in these areas directly under the CIAC banner, however.

First of Many: MCA believes that New Jersey is the logical place to emphasize statewide CIAC work. Leading metropolitan committees in New York City and Chicago have been successful, although working on entirely different problems than the state committees are going to meet. Plans at MCA are to keep tabs on New Jersey's progress and then help organize more statewide programs.

The New Jersey problem shapes up like this: a number of companies and individual plants are already doing an excellent job of community relations in specific areas. But much of the potential mileage is wasted through no statewide coordination and promotion. New Jersey CIAC is designed to remedy this and bring the CPI companies their portion of state goodwill.

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ADMINISTRATION

Sewage Surcharge

New expenses in connection with waste disposal are in prospect for chemical process firms operating in New York City. The city is planning a levy against companies that dump toxic chemical wastes into its sewers. If such a plan should spread to other cities, it could have considerable impact on companies' metropolitan operations.

Reason for New York's move—embodied in a bill drafted by the Dept. of Public Works and due soon to go before the City Council—is to help pay for chemical damage to water-pollution-control plants. Last year, the city had to temporarily close a $50-million treatment plant damaged by chemical wastes from Long Island City, a highly industrialized area.

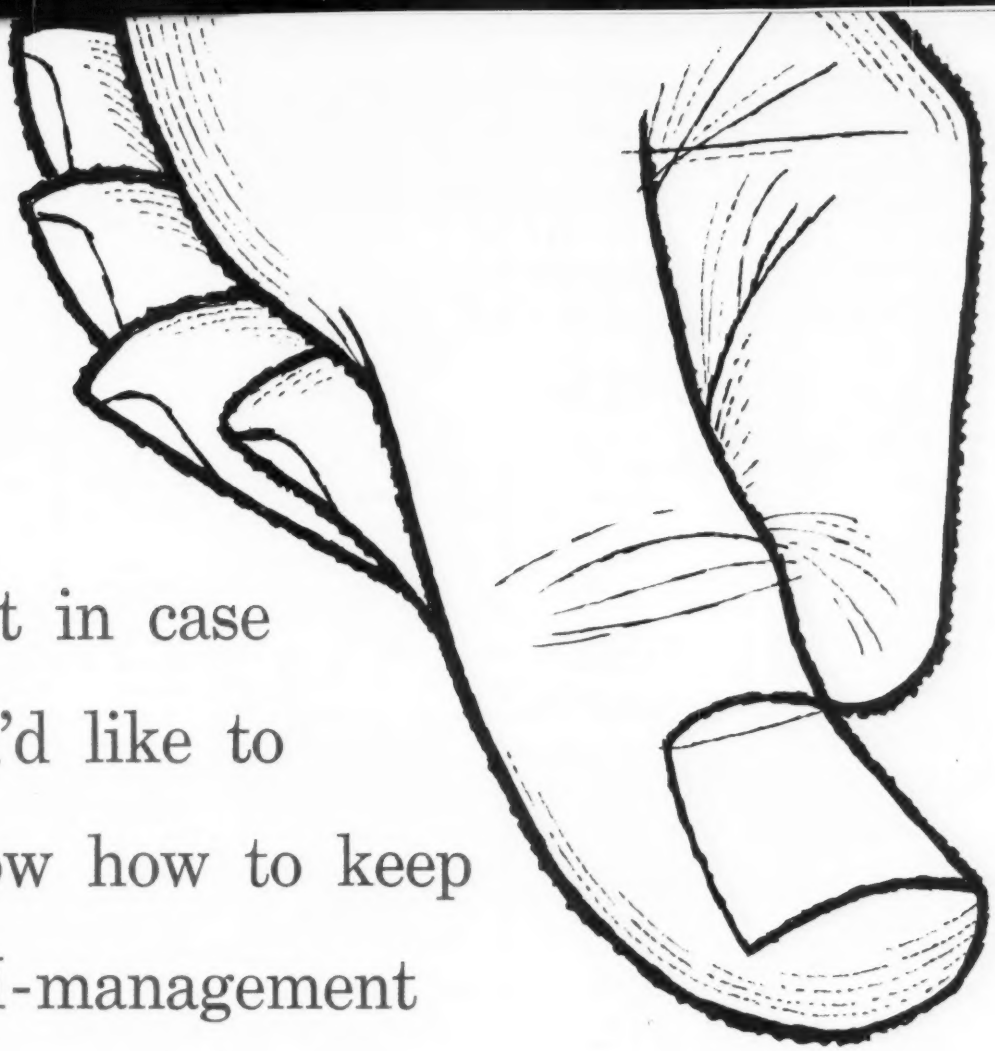
The bill provides for the surcharge and sets up penalties for violators. The amount of the surcharge and penalties have not been fixed. The city emphasizes that the principal aim of the levy is to defray the costs of protecting pollution facilities and equipment, rather than to raise revenues. Studies by the Public Works Dept. indicate that some 8,000 of the 40,000 manufacturers in the city produce waste that would be covered by the law.

The surcharge would be in addition to the sewer-rental charge (one-third the water rate) paid by all sewer users.

LEGAL

Duty Decision: Carborundum Co. (Niagara Falls, N.Y.) has initiated a test-case against the U.S. Customs Service to secure what it calls "a more favorable value for duty purposes" on its imports from Canada. The case revolves around fabric shipped from the U. S. to Canada for processing, then returned to this country for use as a backing material for abrasives. The government contends that the importer must pay duty on the material's full, finished value because it is subjected to a manufacturing process in Canada, then comes back to the U.S. as a different product.

Outcome of the case won't be known for some time, but it may prove significant to other manufacturers with similar operations. A



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CHEMICAL WEEK

BUYERS' GUIDE ISSUE

September 24, 1960
Forms close–June 15.

ADMINISTRATION

Buffalo, N.Y., customs court judge, who reserved decision, has given attorneys 30 days to file briefs, after which the case will be heard by three judges in New York City customs court.

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Black Glob: Hundreds of homes on the east side of Canal Fulton, a village near Columbia-Southern Chemical Corp.'s plant in Barberton, O., were discolored when an accident at the plant resulted in a large quantity of sodium hydrosulfide being dumped into the Tuscarawas River. The chemical turned the water black, formed a big "glob," which started downriver at a leisurely mile-an-hour pace. The "glob"—and its rotten-egg odor—moved to Canal Fulton, where it darkened the white paint on many houses on the east side of the river. (It caused little damage to houses painted other colors.) The gas struck hardest at buldings whose outside walls were wet with dew.

Company officials, who promised to make equitable settlement of damage claims, said that "experience has proved that the only effect the chemical has on paint is a temporary loss of color, with no peeling. Exposure to sunlight restores the original color."

LABOR

Double Loss: In a second NLRB election sought by the United Mine Workers' District 50, after it had lost one in March, employees at the Rocky Flats, Colo., atomic energy weapons plant operated by Dow Chemical voted 582 to 493 to remain with the Denver Metal Trades Council (AFL-CIO).

•

Industry Bargaining: The first joint bargaining in the potash industry near Carlsbad, N. M., is under way. Six potash companies have joined forces to bargain with four unions together.

The four unions are the United Stone Workers, Operating Engineers, Machinists, and Boilermakers. Firms involved are International Minerals, Potash Co. of America, Southwest Potash Corp., Duval Sulphur and Potash Corp., U.S. Borax and Chemical, and National Potash Co. Unions seek a 30¢/hour pay increase, union shop, and company paid insurance, among other things. Present contracts expire May 31.

New markets through new molecules BUTYNEDIOL

$HOCH_2C \equiv CCH_2OH$

Low Cost Multi-Reactive Intermediate for the synthesis of previously inaccessible compounds

Butynediol is an economical raw material, with multiple centers of reactivity, that can be utilized as

a disubstituted acetylene, i.e., by addition: $HOCH_2C \equiv CCH_2OH \xrightarrow{R} HOCH_2\overset{R}{\underset{|}{C}}=\overset{R}{\underset{|}{C}}CH_2OH$

a glycol, i.e., by OH replacement: $HOCH_2C \equiv CCH_2OH \xrightarrow{X} XCH_2C \equiv CCH_2X$

to form cyclic compounds, i.e., trimerization:

$$3\,HOCH_2C \equiv CCH_2OH \xrightarrow{\text{catalyst}} \text{(1,3,5-tris(hydroxymethyl)benzene)}$$

In the synthesis of new agricultural chemicals, Butynediol has proved a convenient starting point for such products as wild oat herbicides, pesticides and defoliants.

Among the other derivatives are products used as pharmaceuticals, textile auxiliaries, corrosion inhibitors, high-energy propellents, and dye intermediates.

Supplied as a solid of 97% purity or in a 35% aqueous solution, Butynediol is in its own right a valuable specialty. It is remarkably effective as an electroplating brightener and corrosion inhibitor.

Write or call your nearest GAF representative for the new bulletin on Butynediol. This booklet reviews the physical properties, important storage and handling instructions, and its chemical reactions. It may suggest new areas of usefulness to you.

From Research to Reality ANTARA

ACETYLENE CHEMICALS DEPARTMENT

ANTARA® CHEMICALS

A SALES DIVISION OF

GENERAL ANILINE & FILM CORPORATION

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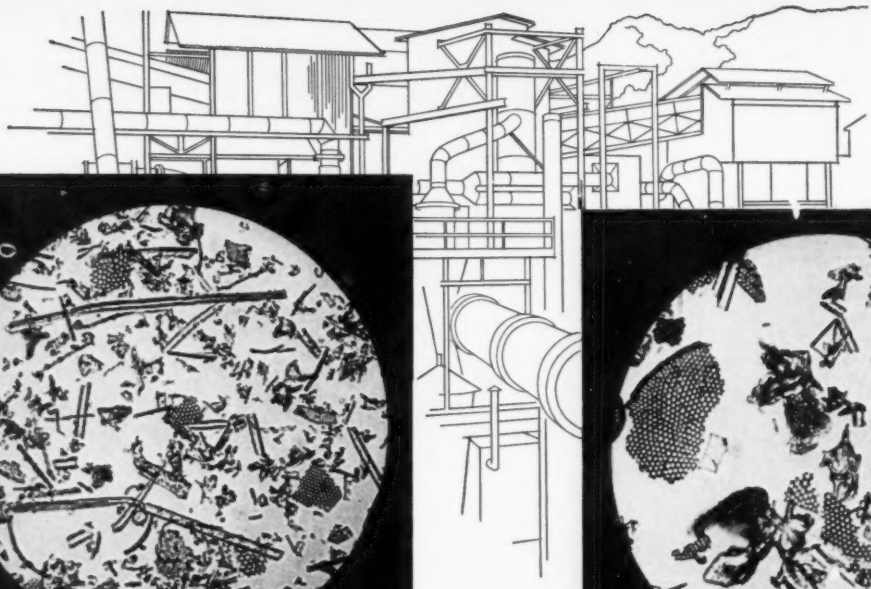


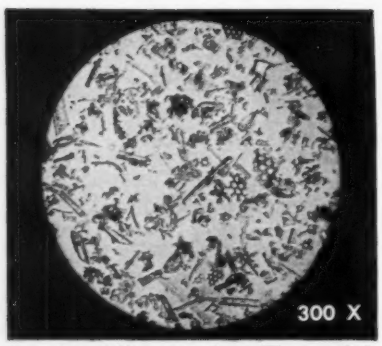
Milling and calcining equipment used for all Celite grades.

For high-clarity filtration of most liquids—use this specially milled diatomite, Hyflo Super Cel.

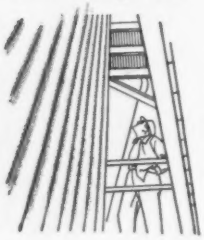
For filtration of larger suspended particles—Celite 545 combines maximum clarity plus faster flow rates.

In diatomites, Johns-Manville precision processing works for you

Constant uniformity in every grade of Celite assures consistent results, less down-time



For mineral filler use—Super Floss grade is made up of carefully sized fines air-floated off in the bag house.



Typical J-M bag house equipment.

As the microscope shows, each grade of Celite* diatomite has its own distinctive particle size distribution. Yet no matter where or when purchased, each remains uniform from bag to bag—your assurance of top production results with minimum down-time.

Three examples of flux-calcined Celites are shown here. Hyflo® Super Cel is widely used for filtration in many industries. It has just the right combination of coarse and fine particles to assure optimum clarity and flow rates. Celite 545, with a higher percentage of coarse particles, is used to achieve maximum clarity and faster flow rates with liquids that have larger suspended particles.

Super Floss, one of several bag house grades, has fine particle size distribution. A white powder, it is processed within very narrow tolerances (less than 1% retained on 325 mesh). It is a popular filler in fine products such as silver polishes.

Johns-Manville can precision-produce so many different grades of Celite because it mines the material from the world's largest and purest commercially available deposit. For assistance with specific filtration or mineral filler problems, talk to a nearby Celite engineer. Or write direct to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

JOHNS-MANVILLE

ADMINISTRATION

KEY CHANGES

Monroe J. Rathbone to chief executive officer and chairman, executive committee, and **Leo D. Welch** to chairman, board of directors, Standard Oil Co. (New Jersey).

Charles J. Haines to chairman and chief executive officer and **James W. Dunham** to president, Chemetron Corp. (Chicago).

Dillon Anderson to board of directors, Monsanto Chemical Co. (St. Louis).

D. W. vanKrevelen and **Earl M. Phillips** to board of directors, American Enka Corp. (Enka, N.C.).

Theodore R. Goebel to chairman and **John S. Freeman** to board of directors, Columbia Carbon Co. (New York).

Alfred H. Drewes and **Sidney F. Thune** to board of directors, National Starch and Chemical Corp. (New York).

Thomas F. Willers to president, **J. G. Baldwin** and **H. W. Hooker** to vice-presidents, and all to board of directors, along with **T. E. Moffitt, R. W. Hooker, R. E. Wilkin** and **R. A. C. Douglas,** Hooker Chemicals, Ltd., Canadian subsidiary of Hooker Chemical Corp. (Niagara Falls, N.Y.).

George H. Lesch to president, and **Edward P. Field, Jr.,** to vice-president, Colgate-Palmolive Co.; **Ralph A. Hart** to president, Colgate-Palmolive International (New York).

Marlin E. Sandlin to chairman, board of directors, Pan American Sulphur Co. (Houston).

B. R. Cancell, T. M. McClellan, Jr., and **W. I. Osborne, Jr.,** to board of directors, and **Philip B. Duffy** and **John A. McDermott** to vice-presidents, St. Regis Paper Co. (New York).

William C. Watson to president, International Division, Chesebrough-Pond's, Inc. (New York).

Robert M. Aude to president, Heyden Chemical Division, and **James K. Lindsay** to vice-president, secretary of the parent company, Heyden Newport Chemical Corp. (New York).

Reeve Biggers to vice-president, Owens-Corning Fiberglas Corp. (Toledo).

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

Published: each Saturday—closes 11 days in advance.

Rate—$3.00 per line ($1.50 per line for position wanted ads), minimum 3 lines. Allow 5 average words as line; Count one half line for box number.

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POSITION VACANT

Silicone expert. Consultant to promotional firm desiring to market new product. Must have comprehensive knowledge of complete field. Outstanding opportunity. P-4375, Chemical Week.

SELLING OPPORTUNITIES AVAILABLE

Specialty equipment company requires manufacturers representative. Should be in the 35 to 45 age range and presently handling similar accounts. Several territories open. Submit resume to RW-4099. Chemical Week.

Who Uses It? We are looking for someone with experience in sales or purchasing who knows what fine chemicals are being purchased on a volume basis, what firms are buying them, and can sell to those interested in finding a better or more economical source. SW-4211, Chemical Week.

Experienced Salesman wanted—industrial chemicals. Chemical background preferred. Worth Chemical Corporation, Greensboro, N.C.

Specialty Fabricator and Manufacturer of Process Equipment desires representation covering Western Massachusetts and Upper New York State. Submit resume to: RW-4308, Chemical Week.

POSITION WANTED

Chemist—MS Eleven years coatings and plastics R & D. Organic and inorganic marine, industrial & oil industry corrosion coatings. Aeronautical, electronics & space systems special purpose coatings, plastics & adhesives. Experience all levels; laboratory, staff, sales & management. Available employment Los Angeles Area or consulting any area. Own Lab. PW-4264, Chemical Week.

Chemical Sales. Broad experience textiles, paper, other segments in industrial chemicals. 20 years plus in South and Southeast. Age 47. No objection to commission if potential justifies. PW-4303, Chemical Week.

Purchasing Agent Available. Eight years experience. Presently employed directing multi-million dollar expenditure for a building materials manufacturer. Wish to relocate from Mid-West to East Coast. Married veteran with B.A. degree. PW-4386, Chemical Week.

Technical Director-Top level, major company product, process, production Research & Development experience. For resume write PW-4385, Chemical Week.

SELLING OPPORTUNITIES WANTED

Manufacturer Agent Available—Detroit Area Distributor offers experienced sales representation by technically qualified men. Warehousing, tank storage, tank-car and box-car unloading, drumming facilities available and delivery. Write Deutser & Willihnganz, 615 E. Greendale—Detroit 3, Mich.

Need commission salesmen?—To sell your products or to solicit contract work. We have them for you—32,000 proven commission sales agents. Albee-Campbell, Inc.,—National Clearing House for Manufacturers Agents. East Street, New Canaan, Conn.

PROFESSIONAL SERVICES

Business Companion. Engineer-Executive retired from large firm available to go with principals or Eng. to survey or set up business in common market area. Knows Europe and languages. Highest references. PS-4250, Chemical Week.

CONTRACT WORK WANTED

Spray Drying—Reputable chemical manufacturer has modern spray dryer located in the Southeast available for custom drying, on volume basis, a wide variety of water soluble materials. Will consider drying solutions or slurries furnished by customer on toll basis. Also equipped to manufacture materials suitable for spray drying. If interested reply CWW-4094, Chemical Week.

SPECIAL SERVICES

Custom Drum Drying, pilot plant and production equipment available to drum dry and grind your product to specifications. Haberland Division, Morningstar-Paisley, Inc., 630 West 51st Street, New York 19, N.Y.

High Vacuum molecular distillation for large quantity runs on a toll basis. Molecular Distillations, Inc., 527 Madison Avenue, New York 22, Tele: PLaza 3-6527.

FOR SALE

Send for Revised Illustrated Circular on our $3,000,000 chemical plant liquidation at Orange, Texas. All T316 SS equipment including tanks, columns, heat exchangers, filters, centrifugals, pumps, valves, pipe, etc. Perry Equipment Corp., 1415 N. Sixth Street, Philadelphia 22, Pa.

Dark Dioctyl Sebacate, Bulk, 32¢ lb. DBS Plast, Virgin Bulk 35¢ Isoprene-Enjay virgin 3 drums $.15. Virgin Neopentyl Glycol-20-100# drums. Trimeth lol Propane 20-100# drums. Barrett Pyridine 15A 3 orig. drums $.35/lb. DDA Plast., Virgin, 20 drs 37¢/lb. FS-4167, Chem. Wk.

Buy To Advantage Acetic Anhydride, Glacial Acetic Acid, Acetaldehyde. "Produced locally for better service to you." Mercury Chemical Corp., Edison, N.J. Liberty 8-1540.

Plasticizer: Lowest prices primary phthalate plasticizer; excellent solvation and efficiency, excellent compatibility with secondary plasticizers. Regularly available in transport trucks or drums. Mercury Chemical Corp., Edison, N.J., Liberty 8-1540.

Baker-Perkins #15-VUMM 100 gal. Dispersion Blade mixer, 100 HP. compression cover, jacketed, motorized tilt, etc. Perry, 1415 N. 6th St., Phila. Pa.

Buflovak Vacuum Shelf Dryers, 110 or 98 sq. ft., with vac. pumps, condensers, etc., Perry Equipment Corp., 1415 N. 6th St., Phila. 22, Pa.

CHEMICALS WANTED

Surplus Wanted—Chemicals, Pharmaceuticals, Oils, Acids, Plasticizers, Resins, Dyes, Solvents, Pigments, Etc. Chemical Service Corporation, 96-02 Beaver Street, New York 5, N. Y. HAnover 2-6970.

WANTED

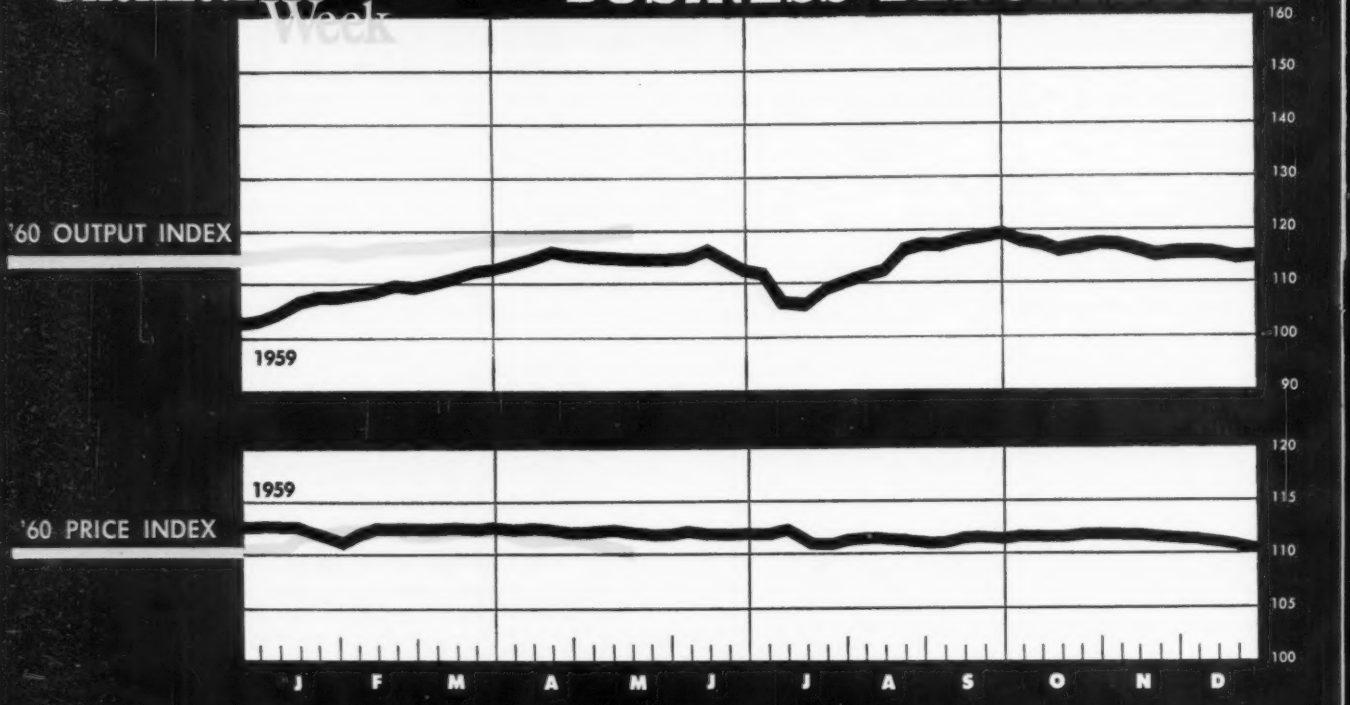
Any quantity—55 gallon stainless steel drums in good used condition. Standard Barrel & Bag Co. 18640 Mt. Elliott Ave., Detroit 34, Mich.

OPPORTUNITIES

business; personal or personnel; financial; equipment; etc., may be offered or located through the classified advertising section of CHEMICAL WEEK. For more information, write to: CLASSIFIED ADVERTISING DIVISION P.O. Box 12 New York 36, New York.

Chemical Week

BUSINESS BENCHMARKS

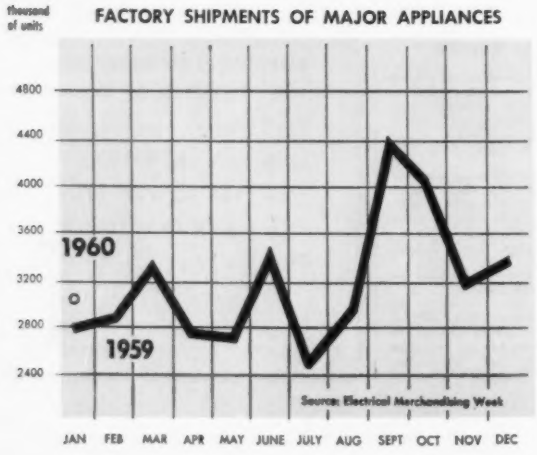


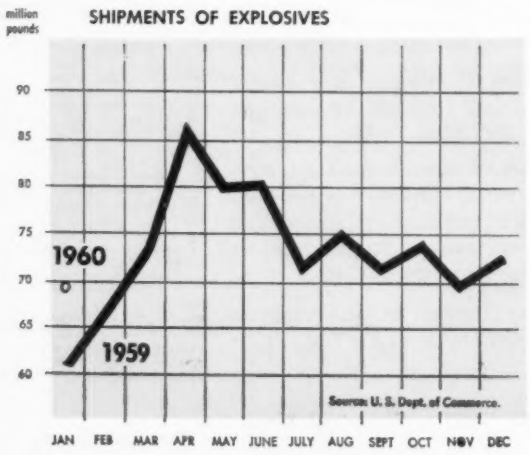
MAY 14, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1947-1949=100)	120.6	120.4	116.0
Chemical Week wholesale price index (1947=100)	108.9	109.3	112.4
Stock price index (12 firms, Standard & Poor's)	50.57	50.39	57.38
Steel ingot output (thousand tons)	2,132	2,210	2,604
Electric power (million kilowatt-hours)	13,300	13,213	12,546
Crude oil and condensate (daily av., thousand bbls.)	7,014	6,983	7,112

	EXPORTS			**IMPORTS**		
FOREIGN TRADE INDICATORS (Thousand dollars)	*Latest Month*	*Preceding Month*	*Year Ago*	*Latest Month*	*Preceding Month*	*Year Ago*
Chemicals, total	121.1	132.7	116.6	30.6	24.5	27.5
Coal-tar products	11.3	11.8	8.2	6.1	4.7	6.0
Industrial chemicals	24.1	26.9	17.8	9.5	9.4	9.2
Medicinals and pharmaceuticals	20.8	22.0	23.5	1.9	2.0	1.4
Fertilizers and materials	8.2	7.7	11.5	11.0	6.7	9.3
Vegetable oils and fat (inedible)	9.5	8.5	3.1	5.2	6.0	7.3

CHEMICAL CUSTOMERS CLOSE-UP





CHEMICAL WEEK • ADVERTISERS' INDEX

May 14, 1960

tracers SECTION

(Classified Advertising)

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Chicago 11 ..... Alfred D. Becker, Jr., R. J. Claussen, 520 N. Michigan Ave., MOhawk 4-5800

Cleveland 13 H. J. Sweger, Duncan C. Stephens, 1164 Illuminating Bldg., 55 Public Square, SUperior 1-7000

Dallas 1 ..... Gordon Jones, James R. Pierce, The Vaughn Bldg., 1712 Commerce St., Riverside 7-5117

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Detroit 26 ..... H. J. Sweger, Jr., 856 Penobscot Bldg., WOodward 2-1793

Frankfurt/Main ..... Stanley Kimes, 85 Westendstrasse, Germany

Geneva ..... Michael R. Zeynel 2 Place du Port, Geneva, Switz.

Houston 25 ..... Gene Holland, W-724 Prudential Bldg., JAckson 6-1281

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Los Angeles 17 ..... Robert Yocom, 1125 West Sixth St., HUntley 2-5450

New York 36 ..... Charles Haines, B. A. Johnson, P. E. McPherson, Charles F. Onasch, L. Charles Todaro, 500 5th Ave., OXford 5-5959

Philadelphia 3 William B. Hannum, Jr., 6 Penn Center Plaza, LOcust 8-4330

Pittsburgh 22 Duncan C. Stephens, Room 1111 Henry W. Oliver Bldg., EXpress 1-1314

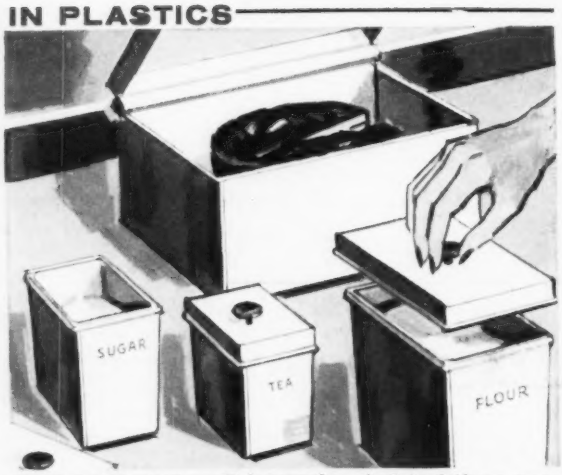
San Francisco 4 William C. Woolston, 68 Post St., DOuglas 2-4600

St. Louis 8 R. J. Claussen, 3615 Olive St., Continental Bldg., JEfferson 5-4867

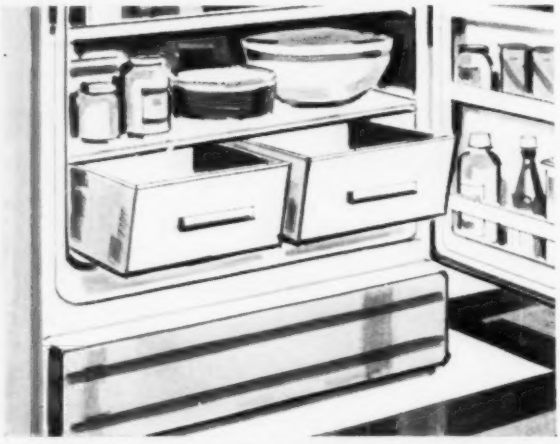
*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60

WHAT'S NEWS IN PLASTICS

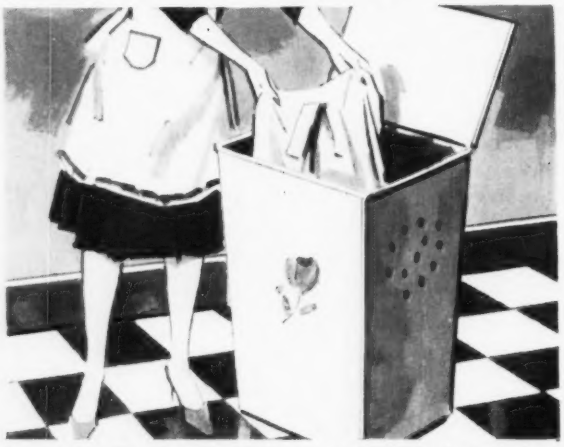
Beats the Heat! Housewares made of Escon get repeated use without warpage. That's because the heat resistance of polypropylene is greater than any other polyolefin. This makes it the desired material for such items as colanders, drainboards, dishpans, tumblers and lighting grilles.



Fresh Point of View! Polypropylene is 2 to 4 times more impermeable to gases and liquids than other thermoplastics. This means freshness stays in, outside elements can't enter. This makes Escon ideal for canister sets, bread boxes and cookie jars—which can be snap-fitted or self-hinged.



Cool Item! Escon is excellent as a food crisper for several reasons. It won't absorb strong food odors and, when properly molded, has the ability to take normal cold without cracking. The design possibilities with versatile Escon are limitless, providing the opportunity to expand existing markets.



New Idea! Escon can be undercut at high speed production cycles. Such items as clothes hampers can be molded in single flat pieces of various colors, then snap-locked for assembly and hinging. This means manufacturers can ship more products in less space . . . retailers will use less storage space, too.

Escon* POLYPROPYLENE CATCHES HER

Important news for molders and designers . . . Escon polypropylene is here! It's the amazing thermoplastic ideally suited to your product needs.

Versatile Escon is easy to work with! It can be injection and compression molded, extruded, thermoformed and heat sealed. The injection molder can start at stock temperatures of 400-450°F., for small items . . . slightly higher for larger ones. In addition, gates and runners for Escon could be of the conventional type, and normal clamp pressures would be employed when molding it. And Escon molds easily—

ENJAY
PLASTICS

EXCITING NEW PRODUCT

ENJAY COMPANY, INC., *15 West 51st Street, New York 19, N.Y.*

EYE WITH NEW BEAUTY AND VERSATILITY

without warpage! Because of its low density, this amazing thermoplastic resin yields more pieces per pound.

For the designer, the high strength of Escon plus its excellent chemical and abrasion resistance allows accurate production of fine and intricate designs with high surface gloss.

And because polypropylene offers greater heat resistance than any other polyolefin, products manufactured from Escon can be readily sterilized by heat or chemical means. *Trademark

THROUGH PETRO-CHEMISTRY

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Escon can help you make a better product! For technical assistance or to order Escon, contact the nearest Enjay office.

ENJAY

PLASTICS

SCIENTIFIC DESIGN

extends its leadership in

PHTHALIC ANHYDRIDE

plant design

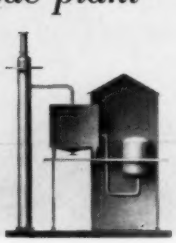
Scientific Design's new phthalic anhydride plant for a leading European company offers these new important features:

- Design for ortho-xylene but fully convertible to naphthalene.
- Lowest priced phthalic anhydride plant available.
- Simplest plant to operate.
- High yields.

Based on successful, full scale operation of the Witco Chemical Company plant, Chicago, SD phthalic anhydride plants, including that for Staatsmijnen in Limburg, Geleen, Holland, incorporate these advanced design and process features:

- Most efficient dry condensation system with many new mechanical innovations.
- Improved residue handling.
- Highest purity phthalic anhydride.
- Precise reaction control—maximum yield.
- Extremely simple treating and distillation.
- Safe, completely monitored operation.

European company contracts for first SD phthalic anhydride plant using ortho-xylene as initial feedstock.



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Leader in Design, Development, Construction of Chemical Plants

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